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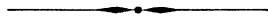
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PROCEEDINGS
OF THE
RIVER IMPROVEMENT
CONVENTION,

HELD IN ST. LOUIS FEBRUARY 12 & 13, 1867.

PUBLISHED BY ORDER OF THE
UNION MERCHANTS' EXCHANGE OF ST. LOUIS.



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OFFICERS OF THE CONVENTION.

PRESIDENT.

Hon. WM. M. McPHERSON,

St. Louis, Mo.

VICE PRESIDENTS.

Hon. L. P. WEATHERBY,
E. O. STANARD,
GEO. L. JOHNSON,
JESSE McINTYRE,
W. C. McCARTHY,
E. B. BRIGGS,
JOHN L. DAVIS,
DANIEL HURD,
J. E. MONTGOMERY,
JAMES PIERCE,
JAMES F. JOY,
R. WOOLFOLK,

Hudson, Wisconsin.
St. Louis, Mo.
Cincinnati, Ohio.
Red Wing, Minn.
Pittsburg, Penn.
New Orleans, La.
Davenport, Iowa.
Cairo, Ills.
Memphis, Tenn.
New Albany, Ind.
Detroit, Michigan.
Louisville, Ky.

SECRETARIES.

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Col. B. F. MARSH,
GEO. S. PACKARD,
W. H. FRY,
H. KNOX TAYLOR,
GEO. A. THURSTON,
H. HAINER,
A. T. NIE,
C. K. PECK,

St. Louis, Mo.
Warsaw, Ills.
Hudson, Wis.
Madison, Ind.
St. Paul, Minn.
Pittsburg, Penn.
Memphis, Tenn.
Marietta, Ohio.
Keokuk, Iowa.

Official Reporter of the Convention.

H. F. ZIDER,

St. Louis, Mo.

ORIGIN OF THE RIVER IMPROVEMENT CONVENTION.

At a meeting of the Board of Directors and members of the Union Merchants' Exchange of St. Louis, held on the 27th of November, 1866, of which E. O. Stanard, President of the Union Merchants' Exchange was Chairman, the following resolutions were offered by Col. Thomas Richeson, which were unanimously adopted:

Resolved, That the citizens of the various States bordering on the Mississippi river and its tributaries, who are interested in the improvement of the navigation of the Rapids of the Mississippi river, be invited to meet in Convention, to be held in St. Louis in January or February next, to take such action as may be deemed advisable to bring that subject before the next Congress; and that this Exchange in conjunction with the City Council appoint the necessary Committee to carry out the objects of this resolution.

Resolved, That the Secretary be and he is hereby instructed to communicate the action of the Exchange to his Honor the Mayor and the City Council, and to ask their hearty coöperation in this, a matter so important to the commercial interests of Saint Louis and the Great West.

ACTION OF THE CITY COUNCIL.

ST. LOUIS, December 15, 1866.
Hall of the Board of Aldermen.

Hon. E. O. STANARD,
President Union Merchants' Exchange.

Sir:—In response to the resolution adopted by the Board of Directors and members of the Exchange, and transmitted to this body on the 27th of November, the City Council have adopted the following resolution:

Whereas the United States Government has caused surveys to be made of the upper and lower rapids of the Mississippi river by a competent Board of Engineers, and who have determined upon a plan for improving the same; and

Whereas said report and plans will be reported and submitted to the present Congress; and

Whereas the speedy improvement of the navigation of the upper and lower rapids of the Mississippi river is of vital importance to the people of this city; therefore,

Be it Resolved by the City Council of the City of St. Louis, That a committee of five—two from the Board of Aldermen and three from the Board of Delegates—be appointed, who, in connection with a like committee appointed by the "Union Merchants' Exchange," shall make, and are hereby authorized to make, such arrangements as they

may deem necessary to secure a Convention of the people of the Northwest to assemble in this city in order to impress upon Congress the necessity of making immediate and sufficient appropriations to secure the improvement of the navigation of the upper and lower rapids of the Mississippi river.

In accordance with the above resolution, the following committee was appointed:—Messrs. H. C. Brokmeyer, A. Kriekhaus, Elon G. Smith, E. A. Richardson, and P. H. Bishop.

Respectfully,

W. H. SWIFT, *Clerk.*

UNION MERCHANTS' EXCHANGE,
Secretary's Office, December 18, 1866.

The following gentlemen are hereby appointed a committee on the part of the Exchange to make arrangements for the proposed Convention for the improvement of the upper and lower rapids of the Mississippi river: A. W. Fagin, Thos. Richeson, Barton Able, James Archer, and James Ward.

By order of the President:

GEORGE H. MORGAN, *Secretary.*

On the 19th of December, the committee appointed by the City Council met with the committee appointed by the Exchange, and organized by the election of A. W. Fagin, Esq., as Chairman of the Executive Committee on the part of the Exchange, and H. C. Brokmeyer, Esq., Chairman on the part of the City Council.

Committees on Invitation, Arrangement, and Finance, were also appointed.

At a meeting held December 22, 1866, W. B. Baker, Esq., was appointed Corresponding Secretary of the committees.

The Executive Committee also appointed James B. Eads, Esq., on the part of the Chamber of Commerce, and Henry C. Brokmeyer, Esq., on the part of the City Council, to deliver addresses on the occasion of the assembling of the Convention.

At a meeting held at Parlor No. 5, Southern Hotel, December 27, 1866, on motion of James Archer, Esq., the Committee on Invitations were authorized to request the Boards of Trade or municipal authorities of such cities on the Mississippi river and its tributaries as may in the opinion of the committee have a business interest in the improvement of the rapids, and who would coöperate in the objects of the proposed Convention, to send delegates to the Convention.

At a meeting held at Parlor No. 5, Southern Hotel, January 10, 1867, the time for holding the Convention was fixed for Tuesday, February 12, 1867.

The Corresponding Secretary, W. B. Baker, Esq., was also instructed to prepare a circular letter of invitation to the various Boards of Trade or municipal authorities of the cities or towns along the Mississippi river and its tributaries, requesting their appointment of the

number of delegates affixed to each city, to represent the interests of their locality in the River Improvement Convention.

In accordance with the foregoing instructions, the following circular letter was prepared and sent out by the Committee on Invitations :

CALL FOR THE ASSEMBLING OF THE CONVENTION.

To the Board of Trade or Municipal Authorities of ——— :

A Grand River Improvement Convention will be held in this city on the second Tuesday, or 12th of February ensuing, in which the people of that portion of the Mississippi Valley connected with your immediate trade interests are requested to be represented. The delegation from your city is fixed at, to be selected, first, by your Board of Trade; and in case no organization of that character exists, then by your municipal authorities. Invitations have gone out to all the principal points on the Mississippi, from the falls of St. Anthony to the Gulf, as well as to the leading cities and towns along the tributaries of that stream, with the view of concentrating on the occasion the wisdom and energies of the citizens of the great Mississippi Valley for the furtherance of the proposed object. The Government of the United States, through the War Department, has just finished a survey of the Upper and Lower Rapids, with the design, if the work is practicable, of removing the formidable obstructions to navigation presented at those points; but as conflicting interests may oppose the necessary appropriation for the purpose, it is advisable that a popular demonstration in favor of the measure should be made. Hence the call for the Convention, and the extensive area embraced in its composition.

The Report of the Topographical Engineers recommends the construction of a canal along the line of those impediments as the best mode for overcoming the difficulties presented; and taking into consideration the comparative economy of the plan, both as respects money and time, there can be little doubt but the suggestion will be adopted. An appropriation of a few millions, therefore, with the occupancy of not more than two years, will place the people of this great Valley in possession of an uninterrupted line of river communication from the head waters of this grand river to its mouth, and secure them as well the advantages of ocean transportation. The subject is of the most momentous consequence, and we cannot doubt you will so consider it, and unite cordially and energetically in presenting the justice of the measure before Congress for its favorable consideration.

An immediate answer—the time being short—is respectfully requested, so that the requisite arrangements may be made for the accommodation of your delegates.

Very respectfully,

JOHN HOW,
GERARD B. ALLEN,
JOHN KNAPP,
D. A. JANUARY,
Capt. THROCKMORTON,
WILLIAM MATTHEWS,
H. E. YEAGER,
WM. M. McPHERSON,
HENRY B. BELT,
WILLIAM D'OENCH,
ERASTUS WELLS,
LOUIS ESPENCHIED,

Committee on Invitations.

WM. B. BAKER, *Corresponding Secretary.*

In conformity with the foregoing circular letter sent out by the Committee of Invitation, which met with a favorable response from almost every organization to which it had been addressed, the preliminary arrangements were made for the assembling of the Convention; and at the last meeting of the Executive Committee, held February 11th, the following programme was adopted for the first day's proceedings :

ORDER OF PROCEEDINGS IN THE ORGANIZATION OF THE CONVENTION.

1. Call to order by his Honor the Mayor of St. Louis, with such remarks as he may think proper to submit.
2. Prayer, by Rev. Dr. Truman M. Post.
3. Appointments of temporary Chairman and Secretaries.
4. Call for credentials of Delegates, and the appointment of a Committee on Credentials.
5. Appointment of a committee of fifteen to report officers for permanent organization, embracing a President and Vice President from each State represented in the Convention, with five Secretaries.
6. Receiving and adopting the Report of the Committee on Permanent Organization and Credentials.
7. Appointment of a committee of two to conduct the President to the chair.
8. Address of Capt. Jas. B. Eads, representing the Union Merchants' Exchange, and Address of Henry C. Brokmeyer, Esq., representing the Citizens.

ASSEMBLING OF THE CONVENTION,

AND ITS PROCEEDINGS.

FIRST DAY—TUESDAY, FEBRUARY 12, 1867.

The Convention assembled at Mercantile Library Hall, Tuesday, February 12, at 11 o'clock A. M., and was called to order by his Honor Mayor James S. Thomas, of St. Louis, who spoke as follows :

ADDRESS OF MAYOR THOMAS.

GENTLEMEN:—As the Executive officer of St. Louis I have been requested to call the River Improvement Convention to order, for the purpose of ascertaining the views of this Convention for the best way for the immediate and speedy completion of this great Western and National enterprise. In behalf of the citizens of this city, I will not deny that our people are much gratified to meet these large and influential delegations from so many States which have this day presented themselves in this Hall as friends to River Improvement, and are determined to accomplish the work; and I extend to the members and all other strangers present the cordial hospitalities of this city.

Forty-one years ago, when I first landed on the western bank of the Mississippi river at St. Louis, this great work of improving the rapids of the Mississippi was spoken of. An old saying that "a work well begun is half done," I believe, will apply to this Convention, and now I propose to begin the work by requesting the Rev. Truman M. Post to pray to God to assist you in your work.

PRAYER BY REV. DR. POST.

Rev. Dr. Truman M. Post was then introduced to the Convention by his Honor Mayor Thomas, and implored the Divine blessing on its labors in the following words :

Almighty God, Creator of the heavens and the earth, Who hast formed the dry land, and poured out the rivers and the seas, we thank Thee for the glad heritage of this fair world that Thou hast given to the sons of men. We thank Thee, O Thou Lord of all, whose are the treasures of the mountains and the deep and the riches of the plains, Who givest us the glad seasons and the productive forces of nature. We thank Thee that Thou hast given all these to men, to human enterprise and labor, and faithfulness in using the powers Thou hast given. We thank Thee for Thy commission to enter into this fair heritage, and subdue and cultivate it for the furtherance of man's comfort, culture and civilization; and, O Lord, we thank Thee for those diversities that Thou hast established in the configuration of the earth, and the gifts of the seasons, and in the gifts of the soil, that thereby Thou hast bound together our humanity as one brotherhood, and connected distant portions and different regions together by the ties of mutual inter-dependence and mutual helpfulness; thus aiding our human life in giving out more strength, more refinement, more power and happiness. And now, O Lord, Who didst form of one blood all nations to dwell upon this earth, and Who didst appoint to them beforehand the times and places of their habitations, we thank Thee for the great country Thou hast given us, for this rich domain, extending from ocean to ocean, and

over the breadth of a zone; for the precious things of the heavens above and the precious things of the deep; for the chief things of the hills, for the riches of the plains, for the gold and the silver and the iron, and for the agricultural productions throughout this vast land: for these we thank Thee, O Thou Great Giver, and we pray that Thou wilt be with us and enable us to consult wisely for the improvement of this heritage Thou hast bestowed. We thank Thee for the gifts of Christian liberty and Christian truth, thereby adding to the forces of civilization and the productive energies of humanity, and the arts that exalt and ennoble and strengthen our human life. We thank Thee for the gifts of those arts which Thou hast conferred through the reason Thou hast bestowed, in subduing the forces of nature, the currents of the river, the altitude of the mountains, the breadth of the desert; for the advancement of civilization, and the extension of free and Christian empire. And now, O God, we thank Thee for this home of our special habitation; for this great valley in which Thou hast poured out this mighty river, binding it together in geographic and social and commercial unity by those vast affluents extending through the breadth thereof, and reaching afar to distant climes, uniting us as one people. We thank Thee that we are one people this day—one in the inheritance of the institutions of our fathers—one in the inheritance of liberty—the inheritance of universal liberty. We thank Thee that we have been sustained in the hours of trial, and that the hand of the great God that brought us to this new world has borne us up, and given us assurance that He will bear us up evermore. Be Thou with us, O Lord, and enable us rightly to use all Thy gifts; and may we ever have wisdom to guide us in the improvement of this great river, and its many affluents, for the amelioration of the social and civil condition of this great people, of this vast valley; and may there be a bond of union extending beyond it all through our borders to the Atlantic, and across the golden mountains to the Pacific seas. O Lord, be Thou with Thy servants this day, and give them counsel; give them wisdom that they may do good service for the cause of civilization, of commerce, of comfort, and of Christian intelligence, throughout the land, this day. Be with thy servants in making this great river a bond of unity, geographic, commercial and social, given by our God. Be with them in all their deliberations, and wilt Thou bless those that have come from afar, keeping them safely while with us, and giving them glad returns to their homes, and life rendered more glad and more highly endowed for the labors performed in this city at this time. O Lord, may all these events—may the gifts of the arts, may the riches of commerce, may the strength of the earth and the seas, and the treasures of the mountains, and the genial things of the hills, and the precious things of the everlasting house of God—may all these be consecrated to the furtherance of Thy kingdom, to the establishment of the reign of grace, and the perpetual establishment in the midst of this people of Christian truth, Christian liberty, Christian refinement and civilization, and Christian love. We ask it in the name of Him who is our Redeemer, Lord, and Creator of all, Jesus Christ. Amen.

At the conclusion of the prayer by Dr. Post, Mayor Thomas came forward, and said that, in order to effect a temporary organization, he proposed the name of General Wm. Vandever, of Iowa, as temporary Chairman; which was unanimously agreed to.

Captain Barton Able moved that a committee of two be appointed to conduct General Vandever to the chair.

Mayor Thomas appointed Captain Barton Able and Colonel Charles Tucker as that committee.

The committee having discharged the duty assigned them. General Vandever, on taking the chair as temporary Chairman, spoke as follows:

SPEECH OF GEN. WM. VANDEVER, of Iowa.

Gentlemen of the Convention:

In taking my position to discharge the duties devolving upon me by your choice, I desire to say that I regard this as an important and auspicious occasion in reference to the interests of this great Valley of the Mississippi, in which it has been our good for-

tunes to have our lots cast. We are here, to-day, I take it, as practical, painstaking and prudent men. The grand object we have in view is to concert measures and ways and means to remove from our doors an important incubus upon our best interests; to remove from the navigation of this great river—the most magnificent upon which the rays of heaven's sun shines—those natural impediments and obstructions to its navigation which are acknowledged to be entirely within the power of man. [Applause.] I regard it, then, as we desire to promote the best interests of those who come after us, as well as to promote our own interests, and as a duty we owe to ourselves as good men and practical citizens at this time, to contribute to the utmost of our ability to the completion of this grand event.

This grand river in its course drains some fifteen thousand miles, while the Atlantic seaboard of the country we inhabit is not more than three thousand five hundred miles in length; and we have rivers, amounting in the aggregate to 15,000 miles. And taking the shores of those rivers into consideration, we have that which is equal to 30,000 miles of inland river navigation, upon whose bosom is floating an amount of commerce three times as great in value as the entire foreign commerce of this country. Now, let me state another fact in this connection: bordering on the upper portion of this valley, and embraced within the limits of what we regard as the five Northwestern States, commencing with Wisconsin and including Minnesota, Illinois, Iowa and Missouri, we find these States furnishing, by well defined statistics of the country, one third in amount and value of the entire foreign export commerce of this country. [Applause.]

Now, then, it becomes a matter of great importance that we have recognized the fact that it is not within the compass of individual effort to accomplish this great object; that it is not within the compass nor within the sphere of a State—whether States bordering on the great rivers which unite the far North with the sunny South, or upon those affluents, which, stretching from the East to the West, almost unite ocean to ocean—but that it is pre-eminently above every other claim that can be made upon the general government a great national work and a great national interest. I simply wish to allude to an idea in this connection. The doubts that have existed in the minds of many in days past in reference to the power of the general government concerning an object of such vast moment and deep interest and solicitude to the people of this country—it has been doubted; but how, in the light of the present day, can it longer be doubted? If a government cannot throw its benign influence, and its protecting power and its ægis over an interest so vast as this, it might reasonably be questioned whether that government possessed the powers of self-preservation. It is analogous to the power of self-preservation inherent in this and in every other government; and as you have seen, when efforts have been put forth threatening the stability of this government, what immense sacrifices can be made by this people; what immense treasures of blood and money can be poured out. Now, when we come down to the peaceful objects of every-day life, which are calculated to unite us once more in a harmonious whole, from the very source to the mouth of this grand river, cannot we unite heart and hand now in burying the animosities of the past, and in establishing a system which shall build up our prosperity and perpetuate it for all time to come?

Gentlemen of the Convention—In order that we may understand more particularly the object for which we are convened, I should desire that the call might be read in your hearing. I will therefore request Capt. Fagin, who is now present, to furnish it, so that it can be read for your information.

The call for the assembling of the Convention was then read by the Secretary, W. B. Baker, and is herewith published at the commencement of the proceedings of the Convention.

J. W. Anderson, of Pittsburg, and H. M. Kingman, of Dubuque, were then elected as temporary Secretaries.

The Chair suggested that a Committee on Credentials be appointed.

The following committee was then appointed on credentials:

J. W. Buchanan, of Clarksville, Mo.; Dr. Calvin Truesdale, of Rock Island; Capt. Le Roy Dodge, of Davenport, Iowa; Col. C. S. Clark, of Mississippi county, Mo., and Col. R. C. Gray, of Pittsburg.

Capt. Barton Able moved that a committee of fifteen on permanent organization be appointed, whose duty it should be to select permanent officers for the Convention, and that the Chairman of each delegation report names to the Secretary, from whom the committee of fifteen should be selected.

B. B. Richards, of Iowa, proposed as an amendment that there should be three from each State represented in the Convention who should compose the Committee on Permanent Organization; which was agreed to.

Mr. Richeson moved that the Convention take a recess of fifteen minutes, in order to allow the delegates from each State represented sufficient time to send up the names of three persons as members of the Committee on Permanent Organization; which was agreed to.

The Convention then took a recess, and when again called to order the Chair announced the following as the Committee on Permanent Organization:

Capt. Barton Able, of St. Louis; Col. John Doniphan, of Platte Co., Mo.; Jonathan Clark, of Mississippi county, Missouri. Calvin Truesdale, of Rock Island; O. C. Skinner, Quincy; H. W. Thornton, Cairo, Illinois. James F. Joy, A. W. Copeland, William Biddle, Michigan. John Robinson, Winona; P. Van Aukin, Hastings; Charles E. Flandrau, Minneapolis, Minnesota. George B. Smyth, Keokuk; J. P. Ament, Muscatine; G. W. Edwards, Burlington, Iowa. William B. Gaw, Chattanooga; G. D. Plummer, Tennessee. E. L. Paine, G. S. Packard, R. L. Libby, Wisconsin. Capt. A. F. Temple, Madison; James Pierce, Jeremiah L. Gard, New Albany, Indiana. Capt. Hiram Burch, Capt. J. V. Throop, A. F. Goshorn, Ohio. W. J. Thompson, Theo. W. Buddeke, and E. B. Briggs, Louisiana.

G. B. Allen moved that the Committee on Permanent Organization be requested to report to-morrow morning at 10 o'clock.

Capt. Able stated that there were delegates on their way from Memphis, from Nashville, and other points, who could not get here until to-morrow.

After some further discussion, the Convention adjourned to meet at 3 o'clock P. M., to hear the report of the Committee on Permanent Organization.

AFTERNOON SESSION.

At 3 o'clock and 20 minutes the Convention was called to order by the temporary Chairman.

Capt. Barton Able, as Chairman of the Committee on Permanent Organization, stated that he wished to make a few remarks to the Convention in explanation of their report. Mr. W. M. McPherson, of St. Louis, had been selected as permanent President of the Convention. [Applause.] He merely wanted to say to the Convention in behalf of the gentlemen who were his associates from the city of St. Louis, that they had presented no name from St. Louis for this office, but it had been tendered as a compliment to St. Louis by the delegations from abroad. Such had been their action, and he thanked

them heartily for it. He believed no abler or better selection could have been made for the office of permanent Chairman than Wm. M. McPherson, one of our most distinguished citizens.

Capt. Able, Chairman of the Committee on Permanent Organization, then submitted the following report :

PERMANENT ORGANIZATION.

President—Wm. M. McPherson, St. Louis.

Vice-Presidents—Hon. L. P. Weatherby, Wisconsin; E. O. Stanard, Missouri; Geo. L. Johnson, Ohio; Jesse McIntyre, Minnesota; W. C. McCarthy, Pennsylvania; E. B. Briggs, Louisiana; Jno. L. Davis, Iowa; Daniel Hurd, Illinois; J. E. Montague, Tennessee; Jas. Pierce, Indiana; Jas. F. Joy, Michigan, and R. Woolfolk, Kentucky.

Secretaries—Col. Marsh, Illinois; Geo. S. Packard, Wisconsin; Wm. H. Fry, Indiana; W. B. Baker, Missouri; H. Knox Taylor, Minnesota; Geo. A. Thurston, Pennsylvania; B. Hainer, Tennessee; A. S. Nye, Ohio, and C. K. Peck, Iowa.

The report of the Committee on Permanent Organization, on motion of Mr. G. B. Allen, was unanimously adopted.

Col. John Doniphan moved the appointment of a committee of three to inform Mr. McPherson of his selection as permanent Chairman.

The Chair appointed Col. Doniphan, T. J. Buford, of Rock Island, and E. Russell, of Davenport, as a committee to conduct the President to the chair.

The committee then introduced the Hon. Wm. M. McPherson, who spoke as follows :

SPEECH OF Hon. WM. M. McPHERSON.

Gentlemen of the Convention :

I cannot but feel gratified by this unexpected compliment that has been extended to me. I do not take such a compliment to myself as much as I do to the city of St. Louis, of which I have the honor to be a citizen. I take it as such and appreciate it the more because it comes to St. Louis. I know not how I can discharge the duties of my position, but I will execute them to the best of my ability, trusting to your indulgence and assistance in the questions that may arise during the deliberations of this body. Gentlemen, this is an important meeting, if a proper use is made of it. The subject is one that is entitled not only to the consideration of the citizens and delegates here assembled, but to the consideration of the law-making power of the nation. It is a question that every one may ask himself with propriety, why has this great question slept so long? why has the nation been permitted to sleep on in lethargy and indifference towards this important question, one that should not be overlooked in the development of this vast valley of the West—this opening and improving the great artery of the inland commerce of this continent? [Applause.] We cannot give any satisfactory answer. Railroad corporations have hitherto seemed to be the prominent consideration of the country. The great schemes of the railroad corporations were to be fostered by, perhaps, laudable endeavors, but they seem to have entirely absorbed the public mind, while this free canal—this free channel of navigation, that will cost nothing but the removal of the slight obstructions which the Rapids above have thrown across it—has been left to work its way as best it could, and the insurance companies and the boatmen meet and struggle as best they can with the obstacles thrown in their way. Gentlemen, it is not a question of promoting the interests of St. Louis, or New Orleans, or Keokuk, or Dubuque, or any of those growing towns or cities that are upon the banks of the Mississippi. It is not a question of contest, as some foolish editors make it, between Chicago and St. Louis, as to their individual ascendancy, but it is a question about what shall be done for the great agricultural interests of this mighty valley. [Applause.] It is a question whether the agricultural

interests shall be taxed beyond endurance, and with them the cultivators of the soil thus far impoverished. Because it takes but little arithmetic to determine that a bushel of corn can be carried but a comparatively short distance by railroad before it is all swallowed up in the cost of transportation, and it therefore becomes necessary for the farmers of this great valley, which in a few years will be capable of feeding the world, to have a cheap means of transportation for their produce to market. That is the question, or whether their produce shall all be swallowed up by a long railroad transportation. It matters little comparatively, whether the trade comes to St. Louis, or goes to New Orleans or Chicago. Chicago may take it all, if you please, all of the products of the farmers' industry; but if the farmers are wealthy, and if we in St. Louis have anything to sell, we shall have a chance to get part of their money. If the farmers' produce comes here, then Chicago has an equal chance of getting some of the proceeds of the sale of that produce, if her enterprising manufacturers and merchants have anything to sell. Who can tell what is to be the wealth and power of this valley? We have mineral resources here, resources for manufacturing purposes; but the great sources of our wealth in the future is dependent on its rich soil and agricultural products. It takes no philosophy or argument to establish that as a proposition, and that it is increasing at an immense ratio. Look at the products now, at the shipments of millions of bushels of grain to St. Louis and Chicago. Yet this valley is still in its infancy. There is scarcely one acre in five that is cultivated. With the population increasing by constant immigration, with the extending of the cultivated land, the increase of the products must be such that it becomes a serious question about the cost of getting them to market. Now, gentlemen, the railroads are an excellent institution. I do not speak lightly of them, and would not disparage them for anything. I have given some of the best years of my life to forwarding the railroad interests of this State, and have, without boasting of it, probably done my share with regard to them. They are necessary, as being among the great arteries of our country, for the distribution of its wealth; but there is a point in railroad transportation at which you must stop, or the best interests of the valley are destroyed. You can carry corn on the railroads for two hundred and fifty miles at twenty cents a bushel. I believe that is the lowest figure. Some roads charge ten cents for one hundred miles, and twenty cents for two hundred miles. But if the distance is extended to twelve hundred and fifty miles, the whole of the corn will be swallowed up by the cost of transportation. These are well known facts. It is a great mistake to suppose that with the growth of the country and its future greatness, railroads will suffice to do the business of transportation, even with double tracks. The time will come when the railroads now in existence cannot remove the produce of the interior sections of the country to the eastern seaboard. Then it will be a paramount necessity that we have water transportation—transportation that will be cheap, and that cannot be checked, save only when the river is ice-bound in winter—a contingency for which we are all prepared. When the river is improved, there will be no rails to break, no ties to repair, but there will be a free channel without cost. All that is necessary to be done will be to load our vessels and float them to market. Then, gentlemen, we have a right to advance the agricultural interests of the West, because there the great interests of the whole country rest. We have a right to call upon Congress to free the navigation of the great Mississippi river by clearing out the lower obstructions also, in the manner science may demonstrate as the best way. To clear out the upper obstacles would entail but a slight expense—an amount equal to one cent per bushel on the grain transported would in a few years pay the cost of this improvement. Yet that small tax would accomplish the saving of several cents per bushel to every farmer or agriculturist who has an article to sell.

Had I received any notice that I was to be chosen President of this Convention, I would have been prepared to present to you statistics which would have shown the advantages of river transportation over that of railroads. River navigation, if these obstructions were removed, would never fail for nine months in each year. Private capital cannot remove those obstructions. It is too extensive an undertaking for private individuals to agree upon and carry out; but the Government, with the same liberality that has appropriated more than a hundred millions of dollars for running a railroad across the continent to California, can appropriate one or two millions to improve the navigation of the great artery of the West—the Mississippi river. [Applause.]

Gentlemen, I made an allusion a little while ago to a contest between various editors

in relation to the rivalry between St. Louis and Chicago. I do not like to speak against editors, because they have papers and I have none. But I, for one, protest against such contests or rivalries. We are two hundred and eighty-one miles apart. There is room enough here to build two larger cities than New York. Every reader of history knows that the great cities of the world have been interior cities, surrounded by vast fields for the development of agricultural and mineral resources. Such must be the history of our country—that the inland cities will have the population—and the time will come when, if they are not great commercial centres, they will at least be mighty centres of power and wealth, larger than any of the seaboard cities. That is as certain as that there is to be a future for our country. We are two hundred and eighty-one miles farther apart than Philadelphia and New York; and as long as they continue to grow to the extent they do, there should be no cause of jealousy. There is another thing I will take the liberty of saying while here. Chicago has shown an enterprise, which, I am sorry to say, has not existed here, and for which they are entitled to the success it gives them. If we remain here as drones, and sleep upon our fancied security and fine location and prospects, and go down, it is our fault, and Chicago is not to blame for it.

All I have got to say to Chicago, is: "If you can get the trade away from us, take it, we do not deserve it;" and to St. Louis, "If you want the trade, you must work for it, and if you show proper enterprise you will get it." There is enough for both. There is ample room for everybody in this country. There need be no jealousy in regard to any of these matters.

To come back to the first principle. We have a matter here in which every citizen is concerned—the improvement of the great arteries of trade by the removal of obstructions, which will give to every producer a cheap transit to and from the market.

I thank you, gentlemen, for the attention with which you have listened to me.

Dr. Knowles, of Keokuk, Iowa, moved that a committee of one from each State be appointed on resolutions.

Capt. R. C. Gray moved to amend, by nominating two from each State represented in the Convention.

On motion, the matter was left to the Committee on Permanent Organization, who were instructed to appoint a Committee on Resolutions, and report the names of the members of the committee to the Convention on Wednesday morning, for their ratification.

The Committee on Credentials submitted the following List of Delegates to the Convention :

DELEGATES TO THE CONVENTION.

St. Paul, Minn.

D. W. Ingersoll, H. Knox Taylor, D. D. Merrill, Jno. Curtis, S. S. Eaton, J. S. Prince, E. Underwood, John Holland, Capt. W. F. Davidson, Capt. J. F. West, A. Hutchinson, R. Blakely.

Red Wing, Minn.

T. B. Sheldon, Paschal Smith, H. C. Hoffman, T. K. Simmons, Jesse McIntyre.

Hastings, Minn.

C. H. L. Lange, P. Van Auken, W. J. Van Dyke, E. B. Allen, J. E. Finch, J. C. Me-loy.

St. Anthony, Minn.

Major A. C. Morrill, Capt. John Martin, H. M. Carpenter, R. W. Cummings, J. B. Gillan.

Wabasha, Minn.

C. C. Green.

Minneapolis, Minn.

W. D. Washburn, C. E. Flapdreau, Richard Price, R. J. Mendenhall, B. B. Meeker.

Winona, Minn.

John Robson, V. Simpson, R. H. F. Morgan, J. J. Randall, E. D. Williams, D. L. Miller, C. L. Bonner, H. D. Perkins, J. R. Hatcher, Z. H. Lake.

Stillwater, Minn.

Isaac Staples, L. E. Ternier, D. Bronson, Jr., E. W. Durant, Fred. Schulenburg.

Nebraska City.

James Thorne.

Hudson, Wis.

L. P. Wetherby, Geo. S. Packard, R. C. Libby, L. Chambers, Thomas Marks.

Madison, Wis.

Major E. L. Paine, Capt. M. M. Edwards.

Detroit, Mich.

A. W. Copeland, Wm. Biddle, James F. Joy.

McGregor, Iowa.

Geo. L. Bass, W. J. Gilchrist, Louis Benton, Jr., Col. Samuel Merrill, Capt. William Fleming.

Dubuque, Iowa.

C. C. Gillman, Gen. Wm. Vandever, C. H. Merry, H. M. Kingman, F. Hinds, F. G. Sil-
ler, Geo. R. Cornwell, Wm. Andrew, T. L. Bowman, N. C. Ryder, J. Wm. Smith, B. B.
Richards, Capt. N. F. Webb, R. J. Gibbs, H. S. Hetherington, W. H. Robison, John Bell,
E. O. Duncan, E. P. Alexander, E. P. Greeley, G. W. Bacon (Jones Co.)

Davenport, Iowa.

D. N. Richardson, B. Burchard, M. J. Rohlfis, Le Roy Dodge, Edward Russell, A. O.
Butler, S. J. Applegate, Nicholas Kuhn, Capt. E. Carleton, Lorenzo Schrickler, Peter
Lane, Henry H. Smith, A. H. Cronkhite, Capt. Abbott, James Goldsburly, Capt. H. A.
Force, John L. Davies.

Muscatine, Iowa.

S. G. Stine, Joseph Richardson, Thos. Hanna, Jno. G. Gordon, R. M. Burnett, Ander-
son Chambers, J. P. Ament, Thomas Marks.

Burlington, Iowa.

Richard A. Barrett, John Ogden, John P. Sunderland, Geo. W. Edwards, Jno. C. Ab-
ercromble, Wm. Bell, Wm. Hillhouse, G. M. Todd, Henry W. Starr.

Keokuk, Iowa.

Gen. W. W. Belknap, Col. J. A. McDowell, S. Hamill, H. Fulton, Gen. H. T. Reed,
Guy Wells, C. K. Peck, R. F. Bower, Dr. F. Knowles, W. A. Patterson (Mayor).

Montrose, Iowa.

L. M. Sloanaker, H. M. Patton, J. R. Boyd, F. Ballanger, G. B. Smith (President Des
Moines Valley Railroad), W. T. Smith (President Iowa Central Railroad).

Lyons, Iowa.

Ira Stockwell, E. W. Thomas, C. M. Baldwin.

Lansing, Iowa.

Joseph Reynolds.

Chester, Ills.

J. B. Holmes, Judge Nevill, David Block, H. C. Cole, Jno. G. Widenough.

Nauvoo, Ills.

Calvin Bradley, John Dornseif, M. Waldenmeyer.

Alton, Ills.

Capt. Jno. Bruher, W. T. Miller, Capt. Geo. E. Hawley, Capt. Wm. Post, C. M. Gil-
pie, Major Geo. Abbott, Capt. Jno. Seaton, Edwin Pfeifferberger, Eli Hollister, J. C. De-
blebower.

Warsaw, Ills.

Chas. Coolidge, Jno. E. Johnson, Henry Hill, Henry Hickok, B. F. Marsh, A. M. Wa-
terman.

Hamilton, Ills.

E. C. A. Cushman, Horace S. Brown, John Morse.

Geo. H. Sanford, Capt. S. Rider
Griggsville, Ills.

J. E. Abbott.
Cordova, Ills.

Belleville, Ills.

J. B. Hay, W. H. Linn, Wm. Kempff, E. H. Fleming, G. F. Kimball, Henry Abend,
Joseph Kirkpatrick, B. Wick, A. B. Russell, J. B. Reutghler.

East St. Louis, Ills.

Dr. Solon Stark, James L. Faucett, Andrew Wittig, B. B. George, John O. Butler.

Andalusia, Ills.

E. H. Bowman.

Quincy, Ills.

James D. Morgan, Thomas Redmond, Charles H. Curtis, H. S. Davis, Henry Allen,
John H. Hotten, George Bond, Lewis Schroeder, O. C. Skinner, M. Boone.

Keithsburg, Ills.

William Gayle, T. B. Cabeen, L. A. Ender.

Rock Island, Ills.

T. J. Buford, P. Bogne, G. J. Robinson, B. B. Buford, G. A. Bittanbauner, C. Truesdale,
Wm. Eggleston.

Millersburg, Ills.

H. W. Thornton, Pres't Warsaw, R. I. & Galena Railroad.

Bath, Ills.

B. H. Getton, J. E. Nelms, H. G. Rice.

Cairo, Ills.

M. A. Bryson, D. Hurd, W. H. Green, S. Staats. Taylor, W. P. Halliday, W. J. Yost,
Hon. J. Dougherty, W. W. Thornton, Wm. Martin, Jewett Wilcox, B. M. Munn.

Madison, Ind.

Wm. H. Fry, A. F. Temple, L. H. Vance.

New Albany, Ind.

James Pierce, S. Stucky, C. H. Meekin, E. Commandeur, J. L. Gard.

Cincinnati, Ohio.

Theo. Cook, T. F. Shaw, W. J. Lowry, T. F. Ekert, Jas. Espy, H. W. Brown, Daniel
Collier, W. Fecheiner, Geo. B. Weidler, A. G. Gano, H. McBirney, Rich'd Smith, J. D.
Lehmer, Briggs Swift, G. Y. Roots, G. M. Hord, T. C. H. Smith, A. T. Goshorn, Geo. L.
Johnson, J. C. Reno, Wm. Resor, J. C. Wilkinson, J. V. Throop, John Kyle, James S.
Wise, Jno. M. Phillips, Adam Poe, J. M. Reed.

Marietta, Ohio.

A. T. Nye, Jr., Hiram Birch, Stephen Newton.

Pittsburg, Pa.

Hon. W. C. McCarthy (Mayor), Capt. R. C. Gray, M. H. Beltzhoover, Wm. H. Brown,
W. Crawford, Jr., A. D. Smith, Jos. W. Anderson, Hugh M. Bole, A. Kirkpatrick, Robert
J. Anderson, Jacob Reese, R. F. Smith, Geo. C. Reese, W. G. Hawkins, J. Hervey Jones,
Joseph Knapp, W. H. Ewing, J. W. Dalzell, N. J. Bigley, John W. Chalfant, Geo. Black,
B. F. Jones, James J. Bennett, L. Matthews (Ch'mn), G. H. Thurston, W. G. Hawkins,
A. D. Smith.

Louisville, Ky.

R. H. Woolfolk, B. C. Levi, H. W. Walton, A. Cooper, F. X. Donahue, C. W. Daniel,
A. V. Dupont, H. Wehmhoff, H. Burkhardt.

Columbus, Ky.

Thomas Brown, J. P. Gray.

Nashville, Tenn.

Capt. H. H. Harrison, Capt. J. M. Smith, H. T. Massengale, W. W. Totten, B. F. Egan,
Albert Roberts.

Chattanooga, Tenn.

Colonel W. B. Gaw.

Memphis, Tenn.

H. Hainer, G. D. Plummer, W. C. Postal, R. H. Dyer, J. E. Montgomery, E. H. Porter, John Cowden, N. M. Jones, Albert M. Price, E. Ackerman.

Little Rock, Ark.

C. N. McDowell.

New Orleans, La.

M. Jeff. Thompson, E. S. Keep, Theo. W. Buddecke, E. B. Briggs.

Independence, Mo.

P. Hinters, Wm. Peacock, Major C. E. Clark.

Canton, Mo.

Z. T. Knight, J. W. Barrett.

Boonville, Mo.

Orsen Davis.

Weston, Mo.

Hon. John Doniphan, Theodore F. Wainer, Charles A. Perry.

Lexington, Mo.

Col. T. M. Ewing, Wm. Morrison, A. F. Williams, John D. New.

Liberty, Mo.

Madison Miller, J. M. Jones.

Glasgow, Mo.

J. H. Turner.

Clarksville, Mo.

W. T. Pepper, Dr. James D. Davis, J. W. Buchanan, K. H. Norris, J. Winn Davis.

Alexandria, Mo.

S. M. Young, Spencer Grennell, William H. Pritchard.

Charleston, Mo.

Jonathan Clark, A. M. Bedford, Geo. Whitcomb, Thomas Beckwith, C. C. Rohlf.

Washington, Mo.

Col. D. Q. Gale, Capt. A. S. Bryan, J. C. Bryan, Capt. N. W. Parker.

Hannibal, Mo.

Wm. L. Hearne, John L. Robards, Geo. Swigart, Austin Brooks, Wm. L. Youse, John Qualey, Wm. B. Mann, J. F. Burchard, M. P. Green, Wm. C. Ebert.

Louisiana, Mo.

Hon. Thos. J. C. Fagg, Wm. C. Orr (Mayor), James N. Henderson, James E. Carstai-
pher.

St. Louis.

Benj. Charles, John How, Wm. M. McPherson, Erastus Wells, I. M. Mason, James O. Broadhead, Adolphus Meier, R. S. Elliott, E. W. Fox, J. S. McCune, N. Cole, L. R. Shry-
ock, C. L. Tucker, James B. Eads, T. J. Dailey, G. B. Allen, Samuel Treat, W. Freuden-
au, S. Waterhouse, S. T. Glover, J. H. Britton, C. S. Greeley, Wayman Crow, Thos. Al-
len, F. M. Colburn, J. J. Roe, Gen. Lewis B. Parsons.

Mayor Thomas, Capt. Barton Able, David White, A. Kriekhaus, A. W. Fagin, Jas. Ward, E. O. Stanard, P. H. Bishop, H. C. Brokmeyer, Thos. Richeson, James Archer, E. G. Smith, E. A. Richardson.

The next order of business being an address by Capt. James B. Eads, representing the Union Merchants' Exchange, Capt. Eads came forward and was introduced by the President, and spoke as follows :

ADDRESS OF JAMES B. EADS, Esq.

Mr. President and Gentlemen of the Convention :

The St. Louis Merchants' Exchange, animated with that spirit of delight which your presence has caused to pervade our whole city, desires to express to each one of you the assurance of its most cordial welcome.

Through one of its members it begs to lay before your honorable body some of the weighty considerations that have moved it to solicit your valuable co-operation in effecting the grandest national enterprise of the present age.

The improvement of the Mississippi river and its great tributaries is a work which not only deeply interests each member of this imposing assemblage, and the vast constituency whom it represents, but in some degree affects the welfare of every citizen within the limits of this whole commonwealth. Fully conscious of the importance, the gravity and the grandeur of the issues and interests involved in the discussion of this subject, I cannot but regret the partiality which has assigned this honorable duty to one who is painfully sensible of his inability to perform it properly. It involves the contemplation of one of the sublimest physical wonders of a beneficent Creator; the consideration of its inestimable social and political value to the favored people who are its possessors, and the question of the power of man's genius to control and direct its mighty currents obedient to his will.

We cannot contemplate the manner of its creation, and the numberless ages required to fit it for man's uses, without the deepest reverence for the power and wisdom, and the most fervent gratitude for the ceaseless bounty of our Heavenly Father. Through countless centuries, long before a human form had reflected the image of his Maker on this planet, we know that this restless stream, whose branches receive their limpid tributaries among the highest passes of the Alleghanies and the Rocky Mountains, was being prepared by an all-wise Creator for man's dominion. Through those dark eras, of which the only record is found on stony tablets among whose Sundered leaves and upheaved masses human lore has traced the marvelous history, the old Father of Waters was silently spreading his fertilizing floods over the vast plains that lie between those mountains on the East and West, and which extend from the cold highlands of the Lake of the Woods and the Assiniboin, away to the sunny clime where milk-white harvests unfold their downy treasures amid cypress groves and the fragrant perfume of the magnolia. Through that long tide of years he was slowly but incessantly creating and enriching this immense valley which is now justly known throughout Christendom as the "garden of the world."

The boundless reservoirs which supply its channels through such long periods of the year and make it so valuable to man, and which, if opened simultaneously, would overwhelm the valley and mar its usefulness, are, with that thoughtful care which orders all things wisely, unlocked in beautiful succession, month after month, by the rosy touch of Spring, as she leaves her home in the tropics to bless with her flowery presence the icy regions of the North.

This giant stream, with its head shrouded in Arctic snows, embracing half a continent in the hundred thousand miles of its curious net work, and coursing its majestic way to the Southern gulf, through lands so fertile that human ingenuity is overtaxed to harvest their productiveness, has been given by its Immortal Architect, every mile of it, into the jealous keeping of this Republic.

The garden which it beautifies and enriches contains seven hundred and sixty-eight millions of acres of the finest lands on the face of the globe; enough to make more than one hundred and fifty States as large as Massachusetts. Acres of the choicest soil in profusion, sufficient to duplicate proud England twenty-four times over. More territory than the areas of Great Britain, France, Spain, Austria, Prussia, European Turkey, and the Italian Peninsula combined. If peopled as Massachusetts is, it would contain five times the present population of the whole United States. Populated as France is, it would hold as many people as the whole area of Europe contains. Peopled as Belgium and the Netherlands are, and with not half the danger of famine or starvation, it would contain four hundred millions of souls—largely more than one-third of the entire population of the world. Human comprehension cannot grasp the grandeur of such an empire. Human wisdom cannot estimate the wonderful value of such an inheritance, over every acre of which the banner of this Republic floats supreme.

This great valley lies between those parallels of latitude that are known to be most conducive to health and to the development of the mental and physical energies of man. In its capacity to produce the cereals, grasses, cotton, sugar, tobacco, hemp, vegetables

and fruits of every kind; in the richness and variety of its mineral wealth, the grandeur and value of its forests, its inexhaustible quarries; in a word, in all the natural resources which conspire to increase the wealth and power of a people, the bounty of Providence has been most wonderfully manifested.

The stream which in every direction penetrates this favored region, and is the grandest feature of North America, holds in its watery embrace the destinies of the American people. Sooner or later it must give to the dwellers within this valley, power and dominion over the whole boundless continent. It is the great arterial system of this Republic, whose heaven-wrought channels should teach the people who possess them, that the Almighty designed them to dwell in love and harmony forever as one nation. There is not adrop within its noble veins that is not loyal to the Union. No effort can be made to sunder the Union that will not vibrate the alarm along its sensitive courses to their most distant and delicate extremities. Its vital branches and wonderful reticulations permeate and envelop the great body of our country, giving unity to amplitude, value to productiveness, and to the State resistless power, and an existence as enduring as human liberty and intelligence. Through its copious channels, for all time to come, are destined to circulate the sustenance and surplusage of its people. Life-giving commerce, who brings in her ever welcome train peace and good will to men, through its many convenient passages will distribute plenty and prosperity throughout the realm. The wealth and luxuries of the generous South will thread its devious currents to their very sources, and will be scattered within the sound of their tinkling rills and sparkling cascades, whilst every wave that is borne towards the gulf will be burdened with the reciprocated offerings of the colder latitudes. From its streams will be sent forth to the less favored nations of the earth, the bountiful abundance of a land far more blessed than that which the prophet of old was permitted to gaze upon, but forbidden to enjoy.

The influence and power of the people of this valley will be limited only by their virtue and intelligence. They can forever rivet to this Union with bonds firmer than brass or steel the States that lie beyond the mountains, outposts of the nation, and which, fringing the commonwealth, constitute buttress and bastion, stockade or portcullis, to give safety and repose to the mighty State within their borders. Self-protection, community of interest, ties of consanguinity and national pride, will hold those States to the great central empire as immutably as the planets are held in their just positions by the attraction of the vast central orb, whose blessed influence gives them stability, and from whose exhaustless warmth they inherit vitality and nourishment.

The march of civilization has crossed the Rocky Mountains and the Sierra Nevada. Its vanward hosts now pause upon the glittering sands of the Pacific. You have ceased to be the Great West. Population, wealth and political power now preponderate in the Valley of the Mississippi. This valley is now the great center. From this day forth and forever, you and your descendants can dictate the laws and policy of this government; aye, of this continent, if you will. You have the numbers, the intelligence and the energy to insure its accomplishment. You have but to combine your strength as you are now doing, and say to your servants at Washington, "these obstructions which lessen the value and mar the beauty of these great national highways, which are a reproach to humanity and a disgrace to this Republic, must be removed;" and your voice, echoing the will of an impatient and indignant people, will command obedience.

It is time that the representatives of the people of this valley in Congress established a national policy—a policy which looks to the heart and body of the nation, and not alone to its borders. Improvements on the seaboard are proper and right; they facilitate the arrival and departure of our foreign commerce. But is not the internal commerce of the nation as worthy of being protected and facilitated? Is it just that everything should be done for the sea coast and nothing for the interior? Is not life as precious and property as sacred in the one as upon the other? Are not the taxes with which those lighthouses and breakwaters are built drawn from the interior as well as from the border? Not a dollar should be voted by the representatives of this valley for any public works either on the borders of this Republic, or anywhere else, while these great rivers remain neglected.

There is no obligation more imperative, no higher duty can devolve upon the statesman and law-giver, than to strengthen the bonds of our Federal Union. In no way can this be done so effectually as by aiding and encouraging commerce between the States, and by facilitating the intercourse of their citizens. The moderation and justice of the laws which govern a country exert an influence less powerful to preserve its unity than that which is exerted by its natural and artificial channels of social and commercial intercourse. The want of such channels may prevent the neutralizing and harmonizing of those social and material effects of climate without which a homogeneous character in the nation cannot be created; and without such character a union cannot be sustained except by force. The absence of such facilities may make the very equality of the law a tyranny in one section of the country, while in the other it would impose no burden.

Formerly, constitutional objections were urged against the improvement of these rivers by those who had no scruples in voting for seaboard works. But such objectors are now rare, and their mischievous quibbles are generally rejected by a loyal people. The wise and patriotic framers of the Constitution intended its blessings and burdens to be enjoyed and shared alike by all in equal and just proportion. They never designed that it should shed a ray more genial upon the ocean's margin than that which penetrates the heart of the commonwealth. Must we be told at this time, in answer to our just demands, that there is a doubt existing as to the power of the general government under the Constitution to improve these rivers, when in the last five years it has built railroads, dug canals, damned the Red river, and pulled out obstructions from streams and harbors, expending tens of millions of the public treasure? Does any statesman gainsay its right to do it then? Does any patriot question its power to do it when the Union was in peril? When the necessity occurred there was a power in the government somewhere to provide for it. This power did not exist in the necessity. It must have existed in the Constitution, for its use cannot be justified, even by the immortal Lincoln, unless it is in the letter or spirit of that instrument. Existing there, and being used to save the Union, surely the same power may be invoked to preserve and perpetuate it; to promote its harmony and increase its blessings. If a doubt exist as to this power, in God's name give the benefit of the doubt in favor of that Union to save which we have lavished the wealth of the nation, and given the precious lives of her people.

If those improvements can be justified because the Republic was in peril, certainly a wise and precautionary policy will justify all reasonable expenditure requisite to provide for its future safety by the removal of obstructions that have cost the government in the last five years, by losses, delays and exorbitant freightage, much more than would exterminate them forever. The importance of safe and rapid water transportation through the Valley of the Mississippi, in every direction, commends itself to the favor of the prudent and sagacious statesman as a great measure of public safety, not only because of the immense facilities which it affords for the rapid concentration of troops towards any threatened point, but also because of the ease with which the wants of our armies can be supplied from this grand central granary of the country. Here, too, on these rivers, in the very heart of the nation, secure from all possible approach of her foes, she can construct and send forth to the ocean her unconquerable navies to protect her commerce, to defend her coasts, and to shed over the future pages of her history the same refulgent glory that beams so brightly on the past records of the American people.

Who in his wisdom or prescience can say where it may next be necessary for this people to hurl the might of their military and naval power; or when the evil day will come again? Must we remain supinely awaiting its coming with all the lessons of experience wasted upon us, the government and the community annually losing more than the total cost of improvements demanded not less by humanity than by common sense, required no less by political prudence than by commercial necessity, and yet complacently arrogate to ourselves the title of being the most enlightened people on the face of the earth? As though man or state could win and wear unchallenged, the seal of greatness without achievements commensurate with the title.

England is to-day, and has been for years past, expending millions in the construction of eight hundred miles of canals among the jungles of India to improve the navigation of the Ganges. Austria, whom we are wont to consider one of the least enlightened nations in Europe, has expended more in the improvement of the Danube alone, since the introduction of steam, than we have upon this great stream and all its tributaries together.

Our law-makers cannot be ignorant of the fact that every additional facility created for the safe and rapid transportation of the armies of the Republic brings with it a corresponding increase in the effective power of its forces, and a decrease in losses and freightage, thus doubly compensating the government for its care and foresight. The benefit of this wise policy does not, however, end here; for it enables the government to shed the blessing of safety over those who are upon such highways, and to create a reduction in the cost of transportation to the people that is felt throughout the length and breadth of the whole country. Thus the purposes of war and of peace are both accomplished at the same time, and with the same expenditure.

For the very laudable purpose of constructing railways from the Mississippi to the Pacific slope, large subsidies have been granted. For the one from Lake Superior to Puget's Sound we have given 47,000,000 of acres of the public domain. This land, at \$1.25 per acre, amounts to nearly \$60,000,000; enough to improve the navigation of thirty thousand miles of these rivers twice over. It is within the bounds of reason to assert that these thirty thousand miles of rivers thus improved could accommodate one thousand fold more of the products of the country in transit than this 1800 miles of railway when completed, and at much cheaper rates. When the railroad is built, it must be renewed from time to time. The track must all be relaid within a few years, at great cost, and the road-bed and bridges will need constant repairs. The improvement of the rivers once accomplished, remains forever a grand and imperishable monument of the genius, the intelligence and the patriotism of the present generation.

It is claimed, and I think with reason, that the government will receive full compensation for these grants by the enhanced value of the lands it retains near these roads. We see how rapidly they are sold as the roads are constructed. The government owns about 400,000,000 of acres drained by these rivers. Their improvement would greatly enhance the value of these lands by making them more accessible to the chief marts of the country. We may safely assume that these improvements would expedite their sale at least five years. Their value at \$1.25 per acre is \$500,000,000; and if this assumption be correct, the government would save five years' interest on that amount, which would be about \$120,000,000 over and above the cost of the entire improvement. If they were sold one year earlier in consequence of these improvements, the government would save as much in interest as the total cost of the work. A tax of one cent per acre per annum on these lands would pay for the whole cost of these improvements in five or six years.

It is not unusual for our best steamers to pay an insurance of twelve per centum per annum on the Mississippi. On the Missouri, Arkansas and Red river, the rate is much higher. The commerce in transit pays a corresponding rate. This commerce was estimated twelve years ago in Col. S. H. Long's report to the War Department, at nearly twelve hundred millions of dollars annually. One per cent. insurance on this immense commerce would be twelve millions of dollars per annum. I have no means of ascertaining the exact amount now paid, but have no doubt that this is less than the reality. Yet this enormous tax of \$12,000,000 does not represent the fourth part of what the country is annually losing by these obstructions. It only represents the absolute annihilation of that much of the created wealth of the people that is destroyed year after year. It exhibits no portion of the uninsured property annually lost, and none of the still more enormous losses incurred by vexatious delays and exorbitant freightage, all of which must be borne by the consumers and producers of this vast commerce. The patient and long-suffering consumers and producers—they who are the sovereign people, "the salt of the earth," claiming to be the most enlightened and intelligent people on the face of the globe, and yet are foolishly, yea sinfully, losing this fifty or sixty millions of their own wealth year after year—losing twice as much as

the total cost of removing the evil, every year, simply because they do not, as they should do, command their servants at Washington to stop this criminal waste at once, and save the blush of shame from mantling the cheek of every thoughtful and intelligent American.

If this government were not a government of the people, made by themselves and for their sole benefit, there might be some reason for this disgraceful neglect. If we were compelled to await the mandate of some imbecile tyrant, impiously claiming to rule us by divine right, we might stand acquitted of this shameful dereliction; but in a land where the will of the people is the supreme law—in a land where they read and reflect—a land where the light of knowledge pervades the whole realm, like the blessed rays of the sun, and glows as brightly in the humblest cottage as it does in the palatial mansion, we should need no other impulse than the spirit of the age and our national pride to urge us to the consummation of this noble enterprise.

I will not at this time occupy the attention of the Convention with a description of the different classes of obstructions which interrupt the navigation of these rivers. It is sufficient for the present to state that similar obstructions have been removed elsewhere. Indeed there is scarcely a river in the whole valley large enough on which to manœuvre a steamboat that cannot be made absolutely safe and navigable. From my own knowledge of these obstructions, I feel fully warranted in asserting that there is not one of them in any of these rivers, great or small, that engineering skill and cunning cannot master. The human intellect, that mysterious light from the infinite wisdom of God himself, that has revealed to man the curious secrets of nature, taught him to time the flight, and weigh as with a balance the ponderous spheres that move in the immense void of space, given him dominion over the elements, and harnessed the very lightnings of heaven to bear his inspirations to the extremest limits of land or sea, is competent to curb and direct those mighty currents, to banish from their hidden depths their dreadful terrors, and make their vast waters the faithful and submissive servants of His will.

In conclusion, Mr. President and Gentlemen of the Convention, I thank you in behalf of the Merchants' Exchange for the patient attention you have given their humble spokesman. The theme is as exhaustless as the river itself, and worthy of the highest eloquence and the gravest consideration of your ablest statesmen. The presence of so many of the earnest men of the country counseling together upon it assures me that the improvement of these waters is already decreed. This grand and imposing concentration of mental force and energy drawn hither from all parts of the valley, is an eloquent illustration of that giant stream which has for some wise purpose been given into the sole guardianship of this people. Its restless waves are borne to our shores by southern breezes that have danced along its surface for thirteen hundred miles. Its wealth of waters are swelled by pine-clad hills whose northern slopes send their sparkling rivulets to the Arctic seas. The Appalachian chain pours forth its stores to swell its power, and mingled in its vast volume are the crystal floods that have brightened the jewelled sands of the Rocky Mountains. You come to us from homes as distant and as various as the sources of that mighty river, representing the wealth, the intellect, and the energy of this Empire Valley of the continent. And when the united force of your wisdom and your will is felt in the Capitol of the Republic—as, thank God, it soon will be—it will give an impulse and power to this movement that will be as resistless as the old Father of Waters when he gathers his annual floods and moves in overwhelming grandeur to the ocean.

At the close of Capt. Eads' address, Alderman Henry C. Brokmeyer, representing the citizens of St. Louis, was introduced, and spoke as follows:

ADDRESS OF H. C. BROKMEYER, Esq.

MR. PRESIDENT AND GENTLEMEN:—On behalf of the citizens, I extend to you a cordial welcome to St. Louis. I do this not unmindful of the honor conferred upon the city by your presence, whether viewed with reference to the number of this assembly,

or the character of the persons present, or the motives which lead you to forsake the pursuits of private enterprise and undergo the privations of a mid-winter journey in order to aid and encourage by your counsel and presence a great national undertaking. The object of the work in contemplation is to render the Mississippi river a safe and uniform medium of transit from St. Paul to the Gulf of Mexico; the questions proposed: ought this work to be done? and, if so, by whom?

In the infancy of the art of transit, man's destiny is fixed by the place of his birth. A river bounds his dominions, and ocean his world; but with the development of this art, the place of his birth becomes less and less important, until it sinks to the significance of a mere accident to man. The river that bound him then, makes him free to seek a home of comfort; the ocean that was the end, becomes the beginning of a world. The art of transit makes man master of the earth to employ its adaptations to his profit. He will not till the stony field with anxious toil for fifteen bushels of corn to the acre, when his labor will yield him eighty in a different locality; he will not starve in squalor and dirt; he will not subsist on villainy and vice; he will not make infamy his bed-fellow in the hovels of London and Paris, Boston and New York, if a full developed art of transit will enable him—poor son of poverty and sin—to find a home where honest labor yields comfort and respect, and no one is poor save the idle. What is the parent of social evil save labor misapplied; and what will induce man to bestow his labor judiciously? Look from New Orleans to St. Paul, from New Orleans to Pittsburgh, from New Orleans to Lasalle, from New Orleans to the great falls of the Missouri, and from New Orleans to the head of navigation of any one of the tributaries of the Mississippi, and read the answer in what you see written upon the banks of those mighty streams—a serviceable medium of transit. What was it that rendered this vast territory between the western slopes of the Alleghanies and the eastern slopes of the Rocky Mountains, 1,200,000 miles in extent, available for social purposes; drew the teeming millions from the overcrowded cities, hamlets and hovels of Europe, and planted them upon the banks of more than 10,000 miles of navigable waters; transform these waters into silver strings on which cities are strung as beads, and their churches and schools as God's jewels to reflect His goodness to man—was it not the mighty Mississippi—to the red man the father of waters, but to the white man the father of cities?

In considering, therefore, the question whether this mighty system of transit-facilities should be perfected, we are not to confine our attention to what is usually termed commercial—that is, the relation which the means of transit sustain to the results of industry—but we ought to take into account the relation which these means sustain to industry as a whole, to the application thereof as well as to its results, to the social no less than to the commercial aspect of the question. Let me illustrate. The surplus product of the agricultural industry in the United States for the year 1860, amounted in round numbers to over one thousand million bushels in cereals alone. Now the commercial question is, how and by what means is this product to be converted, with the least possible loss to the nation, into the various articles required for its continuous production? and the social question is, how is this product to be increased to its highest possible amount by a more judicious application of the same amount of labor?

The labor of turning a furrow of the poorest is the same as the labor of turning a furrow of the richest soil ever tilled. The labor of planting is the same, the subsequent attention is the same; but the harvest, how different! Who doubts but that were the agricultural labor of the United States applied judiciously—i. e., were no part of the labor expended upon inferior soil while the rich alluvium, accumulated perhaps for thousands of centuries, lay idle—I say, Mr. President, who doubts, but that the product of that labor thus applied would be double its present amount? If some calamity should deprive the nation of one half of the product of its agricultural labor for one year, would we not stand aghast at the misfortune and mourn it as a scourge of God? And yet, Mr. President, although no statistics are at hand to prove the estimate correct, still every person present who has observed the application of that industry in these United States, and is acquainted with the wealth of virgin soil that lies idle in the Mississippi Valley, will bear me witness, that the loss sustained by the nation from the misapplied energies in this department alone, are more than equal to such a loss every

year. And why is this, Mr. President? Is it that this labor lacks intelligence to distinguish between productiveness and unproductiveness, between loss and profit? Or is it not because the imperfect means of transit render a profitable change in its application difficult and sometimes impossible? Who settled the Mississippi Valley? Not the humble husbandman that occupies the soil, but Robert Fulton, who, in a commercial sense, turned the current of all the rivers on the globe up stream in one day; George Stevenson, who gave iron muscle to locomotion;—they and their successors, whose energy knows no obstacles but to overcome them; whose courage, no danger but to conquer it; whose generous breasts harbor no local bickerings and jealousy; whose homes are bounded by the horizon of a continent, and the sphere of their enterprise by the limits of the habitable globe—the steamboat and the railroad men, as they are termed—they, and they alone, are the founders of this mighty industrial empire of the Mississippi Valley. And who, Mr. President, that contrasts the social condition of the inhabitants of that Valley with the condition of the communities from which they have been drawn, sees their granaries overloaded with a surplus of five hundred million bushels of cereals per annum; their cellars expanding from year to year to receive the generous juice of the native grape; their mines pouring forth the raw material to the workshops of less favored communities—sees the absolute abundance of all the means to supply the physical necessities of man—sees the means of culture and worship in full proportions—takes into account that this valley can maintain with like abundance a population of two hundred millions of souls, and not be peopled more densely than Massachusetts is to-day;—who, I say, that considers this and then reflects upon the relation which a cheap, safe, and uniform means of transit sustains to such results—that such results are absolutely impossible without such means, and dependent in their realization strictly upon these means, who will not join me and say, in the name of the social well-being of man, let this work be done?

But perhaps we are hasty. The outlay may bear no proportion to the net income. The considerations advanced are general, not tangible, not reducible to dollars and cents. Let us turn, therefore, to the commercial aspect of the question, and consider how the surplus product of one kind of industry is to be converted into the product of every other kind requisite for the continuous production of each, with the least possible loss to the nation. The necessity for this conversion arises from the division of labor, and involves in its execution transportation of the articles in question; but the great necessity for transportation springs from the different degrees of adaptation possessed by different localities of the earth's surface for different pursuits. Now since the intrinsic value of the product is not enhanced by transportation—for a bushel of wheat possesses no greater power to sustain life on the banks of the Thames than on the banks of the Mississippi—the answer in general terms is, by employing the cheapest mode of transportation. The modes of transportation rank in value as follows: Ocean, lake, river, canal, railroad, axle. The cost: Ocean $1\frac{1}{2}$, lake 2, river $2\frac{3}{4}$, canal 5, railroad from $12\frac{1}{2}$ to $13\frac{3}{4}$ mills per mile for a ton of average freight. Now the employment of either mode of transportation being relative waste, and only compensated by the superior adaptation of a specific locality over other localities, for given purposes the use of an inferior when a superior mode is available, is absolute loss. Thus the transportation of fifteen million bushels of wheat, which in round numbers will be the amount shipped in the year 1867 from the river towns on the Upper Mississippi to New York, at a cost of 70 cents per bushel, when the same might be shipped to the same point for 50 cents per bushel, is an absolute loss to the nation of three millions, or one-fifth of the entire amount, counting the value at one dollar per bushel. For the unnecessary labor expended in the transportation, and here expressed by 20 cents per bushel, finds no compensation in the aggregate, but is simply a wilful waste; that is, if in the given case no compensation exists in celerity, promptness and safety.

Here, then, in the wheat transportation alone of the Upper Mississippi a loss of three millions of dollars accrues annually on the basis of existing facilities; but this basis itself is fallacious, for the Northern Line Packet Company, doing a little more than one-half of the transportation on the Upper Mississippi, expended no less than \$211,000 in the year 1866 in consequence of defects in existing facilities—as lightage at the

rapids. Estimating the expenditures on this account for the entire transit in the locality at \$350,000 annually, we have a dead capital at 6 per cent. of \$5,833,333 $37\frac{1}{4}$. This, added to the three million dollars lost by wheat transportation, swells the sum to the enormous figure of \$55,833,333 $37\frac{1}{4}$, exclusive of an amount of loss at the same ratio on 11,243 tons of general produce, 7,302 kegs of highwines, 18,111 pigs of lead, 214,170 head of hogs, and 21,088 head of cattle, which, at a very moderate estimate, increase the annual loss equal to the interest on sixty million of dollars, at 6 per cent. The loss results partly from the employment of an inferior mode of transportation where a superior exists, and partly from defects in the latter itself.

Now if it can be shown that both of these sources of loss can be removed by the expenditures of a sum less than sixty million of dollars, then of course there is no reason on the score of economy why this work should not be done. What, then, are the estimates of the cost of this work?

Mr. President, I am almost ashamed to mention them; they are not sixty, nor fifty, nor forty, nor twenty, nor ten, nor five; but to the eternal reproach of American enterprise, be it said that they are four and half millions of dollars. And upon these four and a half millions of dollars the nation pays annually, in productive industry, \$3,350,000 of interest, exclusive of the loss on general freight, together with the social and political advantages resulting, which far out-balance all such paltry calculations.

Here, then, we have a tangible result,—the nation has given its obligation, has issued its bonds of sixty millions of dollars to a paltry stone bank in the Mississippi river, and pledged the result of the industry of Iowa, Wisconsin, Illinois, Minnesota and Missouri, directly for the payment of the interest, with the entire industry of the Mississippi Valley as the collateral security, and a heavy discount upon the social and material development of one-half of its entire territory. Sir, the time was when man sacrificed infants to rivers, but it is reserved for us to sacrifice the matured and realized energies of manhood to a stone bank. No devotee ever brought his sacrifice more faithfully, no national obligation is liquidated more punctually, than the interest on these bonds; but thank God, our energies are not pledged for the principal at such figures, but only for four and half millions of dollars, and these, with the help of the good will of the nation, shall be paid.

And this, Mr. President, leads us to the consideration of the next question. Who should do this work? Who should liquidate this indebtedness? In considering this we cannot refrain from glancing at the popular reasoning current upon this question, based chiefly upon the old saying, "what is one man's loss is another man's gain." The loss of Iowa and Wisconsin is the gain of Illinois and New York, and since the wealth of the United States consists in the wealth of Iowa, Wisconsin, Illinois, and New York collectively, it is neither increased nor diminished by its accidental distribution among these States. Hence all such objects belong to the States and the individual citizen, with which the general government should not meddle.

In order to examine this let us consider the United States, or the popular impersonation thereof—Uncle Sam, in the grain market at Liverpool. At home he has divided the business between three of his sons—the merchant, the master of transportation, and the farmer. These three supply him with the commodities which he offers for sale. He sells at the highest market price, and sends back the proceeds to be divided among them on such terms as they may agree upon among themselves. Now the popular reasoner says, and says truly, that it is entirely immaterial to the old gentleman what these terms may be. Whether in this division the merchant by superior sagacity may gain an advantage over his two brothers or not. All that the old gentleman has to say is: "Oh, well, it is all in the family; who cares whether Sam, Tom or Harry owns it?" The estate of Uncle Sam stands credited with so and so much, and from this I draw my per centum revenue. If Sam the merchant can make Harry the farmer believe that "the opening of the New York and Canada canals, and of not less than five trunk railroads between the East and the West, has rendered the navigation of the Mississippi a matter of secondary importance;" and that the waters of the Mississippi run through, or over, or under a tropical sea, destructive of most of his articles of export, and that the road from Rock Island, or any other point on the Mississippi river

by Chicago and New York, to Liverpool, Havre, Bremen or Hamburg, is 3,000 miles shorter than by New Orleans, or that the Mississippi river runs through a malarious climate, shunned by every Northerner for at least one half the year, and therefore not to be navigated during that period—if, finally, he can make Harry's cousin, the miner at Galena, believe that he, Sam, will need all the Galena lead for home consumption to be converted into soft sawder in Chicago and New York—if he can do this, as like enough he may try,* this is a matter of no concern whatever to Uncle Samuel, provided it does not result in the national aggregate to a waste of labor in furnishing him with the wheat. But if in consequence of such representations, Harry, the farmer, cultivates two acres of land to raise twenty-five bushels of wheat, when the same might be raised on one acre, and if Tom, the master of transportation, employs \$23 50 of labor, when he might deliver the twenty-five bushels for \$17 50 in the Liverpool market, then the question stands entirely different; for this loss is a loss to the family; not a gain of the merchant of this locality at the expense of a merchant of another locality; but affects the amount that Uncle Sam has to offer in the market, and the old saying that what is one man's loss is another man's gain, applies no longer between members of the same family, but to the United States as seller in a foreign market, and its competitors in that market, and reads thus: What is the loss of the United States is the gain of Russia. A proposition, the consideration of which we humbly submit, belongs pre-eminently to the General Government, and not to the States, much less to the individual citizens in their private capacity, for however it may reason itself out of its duty in this respect, it cannot escape a law much older and more general than any of its own creating—the law of commerce, bearing even date with the law of gravitation, and approved by the same authority.

We assert, then, that as a seller of surplus commodities in a foreign market, the amount of labor expended in placing those commodities in that market is not a matter of indifference to the nation any more than the amount which he realizes for a year's crop is a matter of indifference to the individual farmer. On the contrary, just as the financial prosperity of the latter depends precisely upon this amount, and the proportion it bears to the labor expended in producing the crop, so the financial prosperity of the nation will depend upon the judicious application of its industry at home and its economical conversion in foreign markets. And is this a matter for the individual citizen in his private capacity, or a matter that concerns a State, or does it concern the General Government as the representative of the nation? How is the national indebtedness to foreign countries to be paid, except by the results of productive industries of the nation converted in foreign markets? For if it is true that the incidental distribution of wealth among the citizens, communities and States does neither increase nor diminish the wealth of the nation—although in the relation which wealth sustains as an implement of industry, this distribution is far from being a dormant factor—then it is also true that the borrowing from Peter to pay Paul will not decrease your indebtedness. In order to do this, the nation must convert the surplus products of its industry in a foreign market, and just as much labor as is saved in producing and placing that product in that market, so much national wealth is gained; and however the loss of labor in this respect may be compensated for as between communities of the same nation, there is no compensation for any such loss to the nation itself.

But, Mr. President, there is another point of view from which the proposition that it is no concern of the General Government, that the loss of Iowa and Wisconsin is the gain of Illinois and New York, may be regarded, and that is the political significance of local jealousies in a government like ours.

A few years ago this question could only be answered by analogies drawn from the historical past, and would to God that such were the case to-day; but, alas! an indebtedness of three thousand millions of dollars upon the debit side of the National Ledger, charged to local peculiarities, and jealousies originated and fostered by divers climatic influences and isolation. What an item! Five hundred thousand warm throbbing hearts, the bravest and best in the land, now cold in death, charged to the same

* See report of Chicago Board of Trade.

account. Five hundred thousand mothers mourning their first-born—five hundred thousand fathers calling in vain the sons of their pride—five hundred thousand young maidens and wives weeping for their lovers and husbands, and the come not to comfort them.

"The air is full of farewells to the dying,
And mourning for the dead;
Columbia's heart, for her brave heroes crying,
Will not be comforted."

No, Mr. President, we need no longer search the archives of Rome and Greece. Every State and county, every city and town, village, hamlet and homè of our own broad land re-echoes the answer to this question—destruction of life, liberty and property. And is this, too, a matter of indifference? Is the social and material unity of the nation no concern of the General Government? Is political union based upon power alone, exclusively its concern? Then consider the nature of that power.

What was the initial motive that set the north-western avalanche of power in motion five short years ago? Was it not the free navigation of the Mississippi? What carried that avalanche forward in its resistless course? Was it not, without figure of speech, the current of that mighty stream? What pierced the gloom that shrouded the nation as a pall? Was it not the free navigation of the river restored?

Thus, whether we consider the question as one of material prosperity, or social amity, or political unity and power, the answer is the same—the work belongs to the General Government.

In conclusion, then, we are warranted to say that this work should be done, first, because cheap transit facilitates a judicious application of labor. Second, because it renders the exchange and conversion of that labor profitable. Third, these advantages result, in the case under consideration, from an investment purely self-sustaining, and not speculative in its character; and finally, it should be done by the National Government, because the loss sustained is national, and because the advantages gained are national, whether viewed economically, socially or politically.

Mr. Wells, of St. Louis, stated that the Mercantile Library Hall Association had authorized him to say that members of the Convention were invited to visit the Library at any time that might suit their convenience.

The Convention then adjourned to meet again Wednesday morning at nine o'clock.

SECOND DAY—WEDNESDAY, FEBRUARY 13, 1867.

MORNING SESSION.

The Convention met pursuant to adjournment, and was called to order at 9:45 A. M. by the Chairman, William M. McPherson, Esq., who asked if it was the desire of the Convention to have the proceedings of yesterday read.

On motion, the reading of the minutes of yesterday was dispensed with.

The Chair announced that the first business in order would be the report of committees.

Capt. Barton Able, chairman of the Committee on Permanent Organization, to whom was referred the appointment of a Committee on Resolutions, reported the following

COMMITTEE ON RESOLUTIONS:

Indiana—Charles F. Meekin, A. F. Temple.
Pennsylvania—R. C. Gray, Major Jos. Knapp.
Minnesota—E. D. Williams, W. D. Washburne.
Illinois—W. Eggleston, O. C. Skinner.
Tennessee—W. B. Gaw, H. Hainer.
Ohio—Theodore Cook, A. T. Goshorn.
Wisconsin—R. C. Libby, Major E. Baine.
Missouri—Judge Samuel Treat, James B. Eads.
Louisiana—M. Jeff. Thompson, E. B. Briggs.
Kentucky—R. H. Woolfolk, B. C. Levi.
Michigan—J. F. Joy, A. W. Copeland.
Iowa—Gen. H. T. Reid, H. W. Starr.

Capt. Able stated in explanation of the report that the Committee on Permanent Organization did not deem it was their duty to select the Chairman of the Committee on Resolutions.

The Chair stated that the committee would so understand that it was their duty to select their own Chairman.

Gen. Wm. Vandever said that most of the members were fully acquainted with the character of the reports that had recently been made on the improvements of the Upper Mississippi. There is at present here a gentleman who has been connected with those surveys made during the last two months by Gen. Wilson. This gentleman had a great deal of information, he believed, that the Convention would be glad to hear; he therefore suggested and moved that James B. Abbott, who was connected with the survey, as civil engineer, of the upper and lower rapids, be invited to give such information as he is in possession of in regard to the surveys of the Upper Mississippi river.

Mr. Munn, of Cairo, moved that the information be referred to the Committee on Resolutions.

The President. I can't see that there is anything to refer to the committee when the motion is for the gentleman to give such information as he is in possession of. I don't think there is anything to refer. If it was a paper, you could refer it; but I think you cannot refer the gentlemen to the committee. [Laughter.] The question, then, will be upon inviting this gentleman to give such information as he is in possession of to the Convention.

Gen. Vandever's motion was then put and unanimously carried.

Mr. Jas. E. Abbott then came forward and was introduced by the President, and spoke as follows:

SPEECH OF JAS. E. ABBOTT.

Mr. President and Gentlemen of the Convention:

I have here a letter from Gen. Wilson, which, with your consent, I will ask the Secretary to read.

DAVENPORT, Iowa, *February 9, 1867.*

MY DEAR CAPTAIN—This note will be handed to you by Mr. J. E. Abbott, of Cordova, Ill., one of the Civil Engineers on the Rapids Improvement. He is a delegate to your Convention, and will give you all the data called for in your letter of Jan. 28, just received. I am sorry I have not time to visit St. Louis myself, but am exceedingly busy now in getting up my Illinois river report. I hope St. Louis will not oppose the proposed improvement of that stream, and its connection with the lake, but will give it a hearty and generous support. I see by the morning papers that my report on the improvement of the rapids has been sent to Congress. I wish you could get a copy of it, and I think your Convention might do it by making the request of the Committee on Commerce.

If I can do anything more than I have done in forwarding the interests of navigation on the Mississippi, I hope you will advise me at once, and I will gladly respond.

Very respectfully yours, &c.,

J. H. WILSON.

Capt. JAS. T. GRIFFITH.

After the reading of Gen. Wilson's letter, Mr. Abbott said:

Mr. President and Gentlemen of the Convention:

Allow me to repeat the last clause of this letter: "If I can do anything more than I have done in forwarding the interests of navigation on the Mississippi, I hope you will advise me at once, and I will respond."

Gentlemen, that is the sentiment of the engineer corps that have had charge of the survey of the upper and lower rapids of the Mississippi river, and if the people of the States along that river were half as earnest in the work, it would be done just as soon as time would let it be done. [Applause.] You have asked for information. I have to pick it up by piecemeal. I will say but very little about the lower rapids, as I am not so familiar with them; but I will briefly call your attention to one phenomenon. At the upper rapids we have a river less than two thousand (2,000) feet wide. At the lower rapids we have a river the area of whose cross section is but very little more than the area of the cross section of the river at the upper rapids, and is five thousand (5,000) feet wide, there being about the same amount of water distributed over five thousand (5,000) feet of surface at the lower rapids that there is over two thousand (2,000) feet of surface at the upper rapids.

The lower rapids are one continuous chain of rocks, from their head to their foot; while the upper rapids are a succession of deep pools, obstructed by a few chains of no great extent. Indeed, I was unable to find bottom with a sounding line thirty (30) feet long in some of the pools on the upper rapids, while there are no pools on the lower rapids.

In the engineering details of the survey of these rapids, it was determined—early determined—to be impracticable to improve the natural channel of the lower rapids. When I say impracticable, I do not mean that money would not accomplish it, but that it would cost so much more, and be so much less effective, than another class of improvements; that the examination in that respect was abandoned, and it was made more thorough in view of the construction of a canal around the lower rapids.

Now, as to the details of the canal. The canal around the lower rapids will be seven and six-tenths (7 6-10) miles long, the width will be three hundred (300) feet on the water line, the maximum depth six (6) feet, the minimum five (5) feet; the slopes of the banks will be one and a half (1½) inches in one (1) foot; the length of the locks will be three hundred and fifty (350) feet between mitre sills, the width eighty (80) feet. The lift of the upper locks, located near Nashville, will be eight (8) feet. The lift of the lower locks, located about eight hundred feet (800) feet above what is called Pilots' Indicator, at Keokuk, will be ten and three-tenths (10 3-10) feet. The area of the cross section of the canal will equal one thousand four hundred and sixty-two and five-twelfths (1,462.5) feet for the minimum depth of five (5) feet. The surface velocity that will be admitted in the canal will be equal to one (1) mile every hour. The volume of discharge will be equal to one hundred and three thousand one hundred and sixty-two (103,162) cubic feet per minute. The water power, or theoretical power, will be equal to one thousand nine hundred and thirty-five (1,935) horse power. The effectual power will equal one thousand three hundred and fifty-seven (1,357) horse. Now, inasmuch

as this estimate of water power is predicated upon the idea that there is no navigation passing through the canal—no exhaustion of water by lockages—it is no more than just to estimate to what extent the lockage will naturally destroy that water power. And I may add that if the locks should be discharged twenty-two (22) times an hour, it would about equal the volume of discharge admitted in the canal to create a current of one mile per hour.

In constructing or improving the lower rapids from Nashville north for a certain distance, it is necessary to build a marine wall three hundred (300) feet or more from the water line on the western shore of the river; that wall, together with the lock, holding up the water to the extent that there will be no great amount of excavation at the head of the lock to get five (5) feet in depth. That lock lifts down eight (8) feet into the canal below. That is constructed by building the marine wall outside of the bank of the river, and, being seven and six-tenths (7 6-10) miles in length, it is long enough to deliver boats below all the obstructions of the rapids, in water of the necessary depth. All the surveys of the lower rapids, as well as the upper rapids, are reduced to the plan of reference called low water stage of 1864.

As to the examination of the upper rapids, if time and opportunity offered, I could speak to you more fully. I made a great number of soundings, not less perhaps than fifty thousand (50,000) last fall. I made a thorough recognizance of these rapids, and we early determined that it would be best to improve the natural channel there—not that there are no arguments against that kind of improvement, but from economic reasons. It is well known that we will have great trouble to get money for any improvements. We see by the morning papers that the Committee on Commerce have reported two hundred thousand dollars (\$200,000) for the improvement of the upper rapids, and one million dollars (\$1,000,000) for the lower; yet engineering skill shows that the upper rapids can be improved in twelve (12) months, if it should be a favorable season, and at that rate of appropriation it would take five (5) years to complete their improvement.

At the upper rapids, commencing at a point below the railroad bridge, the average depth of the water in the channel is from nine (9) to eighteen (18) feet, with no obstructions to the channel except two points of rocks jutting out in the channel, known as the lower chain. Pilots now navigate the lower chain successfully, but at the same time when these improvements are completed, there will be opportunity for increased tonnage on the river for larger boats with greater fleets of barges, and therefore it becomes necessary to remove these points. From the lower chain to Moline chain there is from nine (9) to fifteen (15) feet of water in the channel.

At Moline chain there is a peculiar phenomenon. There we have a fall of one foot and four-tenths (1.4) in twelve hundred (1,200) feet, equal to about six (6) feet to the mile; hence there is a very rapid current there, approximating five (5) miles per hour at low stage of water. It becomes necessary to make an excavation at Moline chain about twelve hundred (1,200) feet in length, and there is this peculiarity about it: at the lower end or foot of the inclined plane, the water is deep enough; at the upper end it is too shoal, there being not more than two (2) feet of water at a low stage. Hence there must be a sufficient excavation on it to get a proper depth from the head of the chain to its foot, without disturbing the foot of the chain. Hence the section excavated will be similar to a wedge, with the base up stream. It is now, as I stated before, twelve hundred (1,200) feet long, and when improved will be near sixteen hundred (1,600) feet, thus lessening the angle of elevation of the inclined plane—giving a plane sixteen hundred (1,600) feet long to overcome the elevation of one foot and four-tenths (1.4). In other words, instead of having to overcome an elevation of one foot and four-tenths (1.4) in twelve hundred (1,200) feet, will overcome it in sixteen hundred (1,600) feet. Hence the velocity of the current will be less than now.

In passing from Moline chain to Duck creek chain, we have another pool varying from twelve (12) to fifteen (15) feet in depth. There is about fifteen hundred (1,500) feet at Duck creek chain to be improved. At Duck creek chain there is no very sensible variation in the levelment of the surface; hence the improvement there will not affect the currents at all, nor the volume of water, nor the depth of the channel above the chain.

There is no great variation in the inclined plane from the head of Moline chain to the foot of Sycamore.

At the pool above Camel's chain, there is scarcely any current at all. At Camel's

island, and the slough behind it, there is a cross section of nearly eight thousand (8,000) feet, or about one-fourth ($\frac{1}{4}$) of the volume of the entire river at that point. The proposition is to throw a wall across that slough, and to tie the island in with the main land, throwing the water back in the main channel, thereby increasing the volume of water on Camel's chain about or near six (6) inches. That, together with the excavation to be made at Camel's chain, will give the desired depth of water.

There is but a small amount of work necessary on St. Louis chain to secure a channel of the specified proportions.

At Sycamore chain we have one of those abrupt inclined planes like that at Moline, although not so long. The current is rapid and tortuous, and has one peculiarity about it that none of the others evidence. The reefs on the outside of the channel are worn under until they present an angle of declination of about six (6) to ten (10) degrees; hence the action of the water under these creates what the pilots call boils, and they determine the location of the water by calling it little boils and big boils. And if there are any river men here present, they will bear me out in the assertion that of ten boats of the size of the Hawkeye and Sucker State, in passing up that channel, when struck by the boils, one discharge will carry the boats out of its line. These obstructions will have to be taken off, and a heavy mass of rock taken off on the right hand of the channel going up, not exceeding three hundred (300) feet in area. It is demonstrated by skillful engineering that the velocity of the current may be lessened about one-fourth ($\frac{1}{4}$) at Sycamore chain. One of the means used for that purpose is to tie in an island immediately opposite to the foot of Sycamore chain on the west side of the river, and back up the water at the foot of Sycamore chain. The cross section of water that flows behind that island equals near seven thousand (7,000) feet.

From there we proceed to Smith's chain. In Smith's chain there are no obstructions within the channel, except a center patch, known as Osprey patch, that will seriously affect the velocity of the current. That patch will have to be removed; but the amount of excavation is only about seven hundred (700) yards; that amount of excavation only makes a cross section of about eighty (80) feet; hence the disturbance of the natural channel in that place will amount to nothing, especially when we consider the fact that the points of rock to be removed above it have a cross section of about four hundred (400) feet, and can be disposed of in such a manner as to maintain the equilibrium of the volume of discharge that will be disturbed by taking out Osprey patch.

Another phenomenon about these rapids we need to have understood to appreciate—something on the lower rapids. At Leclaire ferry the river is fifteen hundred (1,500) feet wide, its cross section is equal to twenty-eight thousand (28,000) feet. On Smith's chain we have a cross section of twenty-four thousand (24,000) feet; on Sycamore chain we have a cross section of sixteen thousand (16,000) or fourteen thousand (14,000) feet, I forget which; below St. Louis chain a cross section of thirty thousand (30,000) feet; at Camel's chain a cross section of eighteen thousand (18,000) feet; behind Camel's island, near eight thousand (8,000) feet; at Duck creek chain a cross section of twenty-five thousand (25,000) or twenty-six thousand (26,000) feet, and at Moline chain we have a cross section of less than seven thousand (7,000) feet. Why is it that at Moline chain we have a cross section of only about seven thousand (7,000) feet, and at Sycamore chain fourteen thousand (14,000) or fifteen thousand (15,000) feet? It is owing to the fact of the velocity of the water being so much greater at Moline chain, it takes less time to pass a given amount of water over a given point.

Though we have but very little more water on the lower rapids than on the upper rapids, yet the river at that point is near three times the width of the upper rapids, and with a volume of discharge equal to thirty-six thousand (36,000) or forty thousand (40,000) cubic feet per second, distributed over a surface five thousand (5,000) feet wide, and a velocity of perhaps three (3) miles per hour, it is easily seen that the shoalness of the lower rapids can be more easily overcome by a canal on its banks than by any improvement within the channel of the river.

Again, allow me to call your attention to one fact. I sometimes hear it said that canal improvements would probably exhaust the water of the Mississippi river, and that it is wrong to make such improvements, even when they are necessary. That is one side of the question that should always be met. Now, the cross section above the rapids, where the current is about the same that it will be in the canal, is twenty-eight (28,000) feet; hence, we have water enough there to fill somewhere about eighteen (18) such canals. [Applause.]

At the conclusion of Mr. Abbott's remarks, Mr. Russell, of Davenport, offered the following :

Resolved, That all resolutions shall be presented in writing, and referred to the Committee on Resolutions without debate.

Mr. Harrison, of Nashville. I wish to state to the Convention, that we have been duly appointed from the city of Nashville as delegates to this Convention.

The President. That is not in order under the pending question.

Mr. Harrison. I can assure you, Mr. President and gentlemen of the Convention, that if I am permitted to state our case, my remarks will be in order. There is a resolution now before this house depending on the vote of this Convention. We are here, isolated and out in the cold. We have no representation, although we wish to participate with you and put in our modicum of knowledge. If this resolution is passed, it passes without the sanction of the people from the little village of Nashville, and from the creek of Cumberland. [Laughter.] We want nothing but courtesy, sir, as gentlemen. We have received a few badges, and we have been admitted to your hall. This is the highth, the depth and the length of everything that has been done to us. We feel hurt—not personally, because we, so far as personal friends go, have been treated kindly ; but we think, sir, coming from this little place, that we ought to have some little to say ; and when this resolution comes up for adoption, I cannot vote for it, nor my colleagues. Why ? Because we are not recognized.

The President. The gentleman is laboring under a mistake ; they are reported among the delegates of the Convention, and have the same rights as others.

Mr. Harrison. We have reported, and we have no one in that committee to represent us, not even a notification of that fact.

The President. The State of Tennessee is represented, and we only recognize representatives by States.

Mr. Harrison. We have not even been introduced to the gentleman who is from Tennessee that represents us.

The President. I cannot remedy the gentleman's difficulty ; the question is on the adoption of the resolution.

A Delegate. I rise to correct a mistake under which the gentleman labors.

The President. The gentleman is not in order until the pending question is disposed of.

Mr. Munn, of Illinois. I desire to state that I hope the resolution offered by the gentleman from Iowa will not be adopted. I am not in favor of referring all these resolutions to the hands of the committee. The committee may be out some time, deliberating on what are proper resolutions to come before the Convention. There may be resolutions introduced here that we would like to discuss. I hold in my hand a series of resolutions, three or four in number, purporting to come from the committee from Iowa ; and I would like to know if these resolu-

tions I hold in my hand, and adopted in caucus by the gentlemen from Iowa, are to be included in the resolutions of the committee now deliberating.

The President. They will include all resolutions. I will inform the gentleman.

Mr. Munn. Well, sir, I shall vote against all resolutions, and hope the members will be prepared to offer resolutions while the committee is deliberating, and after they come in. It may be suggested to some gentlemen here that these resolutions to be reported by the committee will not embody all the views that may be entertained by gentlemen of the Convention; and if all these are referred to that committee, and they report on them, there is nothing more to present to the committee, as they will have prepared all the resolutions required of them.

A Delegate. The gentleman from Nashville seems to be laboring under a mistake.

The President. That question is out of order until we dispose of the resolution. Explanations must come afterwards.

The Delegate. I take it this is a pertinent question, because the point they raise to this resolution is this, that it excludes the delegates from Tennessee from a voice; that they are not represented on the Committee on Resolutions. In that the gentleman is mistaken. The State of Tennessee is represented in the Committee on Resolutions. Hence the point he makes is not well taken.

Mr. Elliott, of St. Louis. I am opposed to the adoption of the resolution, for the reason that if a proposition is brought before the Convention which the Convention does not choose to adopt, this Convention is to be presumed to have sufficient command over itself on a motion to refer that resolution. The Committee on Resolutions are now out, and what is there before the Convention while they are out? They are supposed to be preparing resolutions to be brought before us, and, while that is going on, debate is just the thing we want. We have had an interesting exposition from the Engineer Corps in regard to the Mississippi, and I wish to hear from those gentlemen who have come here while the Committee on Resolutions are out, otherwise we might take a recess until the committee is ready to report.

Mr. Gilfillan. I move to amend the resolution by striking out the words "without debate."

Mr. Russell. In regard to my resolution, I would say that if we enter here upon the discussion of resolutions, we may discuss precisely such resolutions as the committee may report. I think, therefore, that it would be only a waste of time. If the committee fail to report such resolutions as this Convention may see fit to approve of, we can then adopt any resolutions that we deem proper; but, until we have the report of the committee before us, the discussion upon resolutions is a waste of time.

Mr. Gilfillan, of Minnesota. We have appointed a Committee on Resolutions, and, until that committee report, we have nothing to do

with resolutions whatever. With all proper respect for that committee, we should wait, so far as the subject of resolutions is concerned, till they shall have reported, and then take up such resolutions as they present, and dispose of them as we see fit. I therefore move an adjournment of this Convention until three o'clock, in order to give the committee time to report.

Mr. Ingersoll. Before voting on the motion, would it not be well to wait on the committee to ascertain how soon they can report. Will the gentleman withdraw his motion for that purpose?

Mr. Gilfillan. I will do so.

Mr. Ingersoll. I move that a committee of two be appointed to ascertain how soon the committee can report.

The President. Now that the motion is withdrawn, the question is on the adopting of the amendment to the resolution.

Mr. Elliott. In order to call out discussion, I will make a motion that will bring out discussion upon the points that are to come before this Convention. I move, sir, that a committee be appointed to prepare and report an address to the people on the subject of river improvement by the General Government.

The President. It is not in order at this time. There is a pending question.

Mr. Elliott. Then I ask the floor when this matter is disposed of.

Mr. President. The question now before the Convention is the resolution offered by the gentleman from Davenport, that the amendment that the words "without debate" be stricken out.

Mr. Gilfillan insisted on his motion to adjourn.

The motion to adjourn to three o'clock was lost.

Mr. Bryson, of Cairo. When we receive resolutions, if it is deemed best to consider them, I see no necessity to gag ourselves so that we cannot consider them. I think we should keep the whole matter in our own hands, so that we can consider what we wish, and refer what we please. If we vote to strike out the words "without debate," we then are compelled to refer every resolution. I do not think that the Convention has any disposition to gag itself at this early stage of its proceedings.

Mr. Morgan, of Quincy. I think, sir, that this question is entirely out of order. We have a committee now from every State represented here, and I do not wish to take the business out of their hands. Let us wait patiently until that committee report. I don't believe in gagging ourselves at all; but let us wait until the committee report.

Mr. Russell withdrew his resolution.

Mr. Ingersoll moved that a committee of two be appointed to wait upon the Committee on Resolutions and ascertain at what time they will be ready to report. Carried.

Mr. E. O. Stanard moved that the letters in response to the invitations sent out received from Governors of States, Members of Congress, and Presidents of Railroads, favorable to the improvement of the rapids,

be now read. He believed, that as many of these men had not been able to attend, their letters would be of interest to the Convention.

Mr. President. Before the Secretary proceeds to read the letters, I would say that a motion has been made that a committee of two be appointed to wait upon the Committee on Resolutions and ascertain at what time they will be ready to report. I will appoint upon that committee Mr. Ingersoll and General Parsons.

W. B. Baker, Secretary of the Executive Committee, then read the following letters:

WASHINGTON, February 8, 1867.

Gentlemen:—I have the honor to acknowledge the receipt of your letter of the first of this month, requesting my attendance at the River Improvement Convention to be held in the city of St. Louis on the 12th instant. My public duties do not allow me to accept this invitation; but you need not doubt that I cordially approve the objects and purposes for which you propose to assemble.

The improvement of the navigation of the Mississippi river, and the consequent reduction of freights upon Western staples, is a question, if possible, of more interest to the people of Minnesota than to the inhabitants of any other portion of the great valley; and I may be pardoned the expression of a hope that the attention of your Convention may not be confined to the consideration of the improvement of the upper and lower rapids alone, but may embrace other objects of scarcely secondary importance.

At the last session of Congress, I moved and carried an amendment to the river and harbor bill, providing for an examination and survey, under the direction of the Secretary of War, of so much of the river as lies between the Falls of St. Anthony and Rock river rapids. This was the first instance of recognition by the general government of the rising importance of the great and growing commerce of the upper Mississippi. The examination has been prosecuted during the past season under the able supervision of General G. K. Warren; and while the removal of obstacles to navigation presented by the upper and lower rapids will naturally occupy a prominent place in your deliberations, I trust that the improvement of five hundred miles of river navigation above the upper rapids will receive at your hands the consideration and support it merits. More than a million of people in the States of Minnesota, Wisconsin, Iowa, and Illinois, are directly interested in this contemplated improvement; and at least ten times that number East, West, and South, are more remotely concerned.

Hoping that your councils and discussions may promote the great end in view, and redound to the advantage of the inhabitants of the great valley throughout its entire length,

I am, very respectfully, your obedient servant,

ALEX. RAMSEY.

Messrs. John How, Gerard B. Allen, John Knapp,
Committee on Invitations.

STATE OF WISCONSIN, EXECUTIVE DEPARTMENT,
Madison, February 7, 1867.

Messrs. John How, G. B. Allen, and others,
Committee on Invitations, St. Louis, Mo.

Gentlemen:—I am in receipt of your invitation to attend the River Improvement Convention to be held in the city of St. Louis on the 12th inst., and regret that it will be impossible for me to be absent from the State at the time. Were it not so I should certainly be present, for I do not underestimate the importance of the enterprise which you are seeking to consummate.

The improvement of the Mississippi river, of vast importance to the whole nation, is peculiarly important of course to those States bordering upon it and its tributaries.

Be assured, gentlemen, that any reasonable scheme which may be adopted to bring the project to a successful issue will receive the hearty approval of the people of Wisconsin..

I am, gentlemen, very respectfully, your obedient servant,

LUCIUS FAIRCHILD, Governor of Wisconsin.

STATE OF ILLINOIS, EXECUTIVE DEPARTMENT,
Springfield, February 4, 1867.

John Howe and Gentlemen of the Committee on Invitations, St. Louis, Mo.

Gentlemen:—I have this moment received your letter of invitation to attend the River Improvement Convention, to be held at St. Louis on the 12th inst. Heartily indorsing the objects to be accomplished by the Convention, desiring to see every impediment removed so as to leave uninterrupted navigation of the Mississippi river, anxious to aid every effort to induce the national government to improve the natural and obvious channels of trade in our own State, I have consented to attend the Convention on the 12th inst., if it shall be possible for me to leave Springfield for that purpose.

Very respectfully, yours,

R. J. OGLESBY.

STATE OF MISSOURI, EXECUTIVE DEPARTMENT,
City of Jefferson, February 4, 1867.

Gentlemen:—I have the honor to acknowledge the receipt of yours of the 1st instant, extending to me an invitation to attend "a grand River Improvement Convention, to be held in St. Louis on the 12th inst."

The subject is one in which every citizen of the great valley has an interest, and you may be assured that I esteem it a pleasure, as well as a duty, to do whatever is possible on my part to promote the objects you have in view. I will certainly be with you.

Very respectfully, your obedient servant,

THOS. C. FLETCHER.

Hon. John How and others, Committee on Invitations.

The President. I have a letter here from Mr. J. P. Hays recommending a river plow for the removal of sand-bars. What will you do with it?

A Delegate. I move it be filed.

Mr. Gillman, of Dubuque. I move that a paper prepared by Professor Waterhouse be now read to the Convention.

The motion was ageed to.

PAPER READ BY PROF. WATERHOUSE, *of St. Louis.*

Mr. President and Gentlemen of the Convention:

The right of a government to institute internal improvements is one of the essential incidents of sovereignty. Under all forms of politics, this power is justly vested in the controlling authority. Even despotic governments, which reverse the republican idea, and administer affairs of state in the interest of a titled minority, have exercised this power for the benefit of the nation. Austria has expended large sums for the improvement of the navigation of the Danube. But a democracy rests upon the fundamental principle that the interests of the people are supreme. Our republican Government, in which is vested the exclusive control of internal improvements, is then bound by the most solemn obligations to consult the general welfare of the nation. But if it neglects this trust, then momentous interests which have been confided to its sole guardianship and fostering care must suffer, and popular rights which can appeal only to constitutional processes of enforcement will be ignored.

In the present instance, our duty is not arduous. The unmistakable jurisdiction of Congress, the frequent precedents, and liberal policy of the Government, leave us only the easy task of showing that the proposed improvement of the Mississippi Rapids is a work of national importance.

The Mississippi and its affluents, draining an area of more than 1,000,000 square miles, and affording a water-carriage of more than 15,000 miles, form a system of river navigation unequalled in the civilized world. The entire coast line of the United States is less than 13,000 miles long; but the river line of the Mississippi and its tributaries, including both banks—is more than 30,000 miles long. The trade which now

floats on these waters is immense. Its magnitude startles the imagination. In 1860, the total foreign commerce of the United States was \$760,000,000. In 1865, the trade of nine cities on the Mississippi and Ohio rivers amounted to \$747,000. The annual commerce of the Mississippi valley is now estimated at \$2,000,000,000. The yearly traffic of the *upper* Mississippi, which would be *directly* affected by the obstructions in the river, is \$150,000,000. The amount of commerce which is annually deflected from the Mississippi by the difficulties of navigation is computed at \$100,000,000. The yearly damage which the rapids inflict upon navigation is appraised at \$10,000,000. In 1865, the direct loss occasioned by the impediments at Keokuk amounted to more than \$500,000. The eight miles of obstructed navigation sometimes delay a steamer five days. This detention is a source of great expense. A steamer with a carrying capacity of 18,000 bushels of sacked grain would require a force of sixty hands. The daily cost of so large a crew is heavy. A delay of three or four days entails a great expense. After the improvement of the rapids, a tow-boat, with the same motive power, and a crew of twenty hands, would transport 225,000 bushels of grain. The *Ajax* once towed from Louisville to New Orleans 460,000 bushels of coal. For more than half of the boating season navigation is embarrassed by low water on the rapids. During the period of shallow water no boat can carry freight enough for a profitable trip without lighting over the rapids. But the employment of barges involves a serious expense. In the absence of elevators it has necessitated the use of sacks. Wheat sacks now cost from seventy to eighty cents apiece; or, if hired, two and a half cents per bushel for each shipment. The expense of the four transfers at the Rock Island and Keokuk rapids is twelve cents a bushel, and the loss from waste is seven cents more. During the season of 1866, the Northern Line Packet Company paid \$21,100 for lighting over the rapids. This sum is more than the yearly interest of \$3,500,000 at six per cent. The packages received by this company numbered in

1865	1,243,000
1866	979,000

This decrease of 264,000 packages was entirely due to low water. The company estimate their receipts for 1866, in case there had been uninterrupted navigation, at 2,500,000 packages.

The present method of handling grain is very expensive. The waste of grain by carriage in sacks, the extra labor, the transfer to the shore, the damage, the cost of tarpaulins, and the injury to the sacks, amount to 16 cents per bushel. The dangers of navigation increase the rates of insurance. The perils of the rapids add one half of one per cent. to the price of every bushel of grain which is shipped to market from the Upper Mississippi. This assessment upon the industry of farmers is oppressive and unnecessary. Under all the existing difficulties, the freight of cereals from the Upper Mississippi to New York is far cheaper by way of New Orleans than it is by the lakes and the New York canal. The comparative rates of transportation from Dubuque to New York are:

Via the Lakes	68 cents per bushel.
" New Orleans	38 " " "
Difference in favor of Southern route	30 " " "

The present cost of shipping grain from Chicago to Cairo by *rail*, and thence to New York by water, is no greater than the freight to the same point by way of the lakes. The existing winter tariff on wheat in bulk from Chicago to New York is

By the Lakes	44 cents per bushel.
From Chicago to Cairo by <i>rail</i>	20 " " "
" Cairo to New Orleans by water	12 " " "
" New Orleans to New York by water	12 " " "

So great is the cheapness of river carriage that the rates of the Southern route, increased by 300 miles of costly railroad transit, do not exceed those of the Northern line.

There is an actual saving of 30 cts. a bushel by the New Orleans route; yet, at present, so great are the delays, risks and infacilities of river transportation that the Northern lines of transit are still preferred.

It is thought that, after the improvements of the rapids, the introduction of barges for the transportation, and the erection of elevators for the transfer of grain in bulk, the freight of cereals from the Upper Mississippi to New York will be reduced to twenty-five cents per bushel. After the completion of these public works, the successful competition of the Mississippi would compel the railroads to reduce their rates of carriage. Even if there was no change in the channels of transportation, this reduction of freights would itself justify the removal of obstructions in the Mississippi. But there will be a change in the routes of freightage. Uninterrupted water carriage always affords the cheapest transportation. This fact is forcibly illustrated by the present movement of cereals. More than 75 per cent. of the grain received at Chicago is carried there by rail; but from that point only 10 per cent. is sent eastward by rail; 90 per cent. is shipped by the lakes.

It is sometimes alleged that the heat in the Gulf of Mexico is too great for the safe transport of grain by the Southern route. Corn is much more liable to be damaged by atmospheric influences than wheat; and the flour made from spring wheat is far more susceptible of injury from humidity than the grain from which it is manufactured. Yet the present trade of New Orleans in corn and spring wheat flour is immense. Besides, the movement of Western cereals is made in the cooler months. Almost all our shipments of grain are made from September to June; so that, even if the mid-summer heat of the Gulf was an objection to the Southern route, the difficulty would be obviated by the season of transportation.

The fact, too, that large quantities of Western flour are now exported without injury to the trans-equatorial countries of South America must not be ignored. Wheat is carried unharmed from San Francisco around Cape Horn to New York. The vast amounts of grain which are brought to Europe from the Danubian provinces through the high temperature of the Mediterranean, reach their destination in a sound condition. The assertion, then, that cereals would be seriously injured by warmth and moisture in their passage through the Gulf, is an allegation unwarranted by facts. A fear so foreign to commercial experience may be dismissed as a baseless apprehension.

But the Mississippi river, though entitled by a divine patent to the transportation of this valley, is now defrauded of its rights. An unlineal heir enjoys the inheritance. The value of the traffic deflected from the Mississippi into unnatural channels reaches an annual aggregate of tens of millions. In 1865, out of the 48,000,000 bushels of grain shipped to Chicago, 15,000,000 were brought from points on the Mississippi. According to Mr. Dodge, three-fifths of all the wheat received in 1865 at Milwaukee and Chicago came from the towns on the banks of the Mississippi.

The shipments were—

	Flour—bbls.	Wheat—bush.
East by rail	273,252	12,551,014
South by river	37,372	1,468,281

The following figures, furnished by Mr. Gilman, of Dubuque, express the actual cost of shipments from Chicago to New York :

Date.	Vessels.	Bushels.	Freights.	Sundries.
Oct. 1, 1865.	P. P. Cunningham	12,761	\$4,608 01	\$232 62
" 7, "	E. P. Dorr	11,679	5,527 25	552 85
" 21, "	Sailor Boy	18,700	7,946 87	445 02
" 31, "	Collingwood	16,313	6,634 56	495 95
Nov. 8, "	Dolphin	14,000	4,545 90	245 65
" 8, "	W. F. Allen	18,374	4,023 89	366 90
		87,827	\$33,286 18	\$2,438 00

There was also an additional charge of \$2,195 67 at the Chicago elevators. Hence the total expense of these shipments was \$37,920 84, or more than 43 cents a bushel. This exhibit does not include commissions, storage, interest, insurance, government tax or losses; but it does embrace wharfage, towing, measuring, sampling, and the cost of transfer at the Buffalo elevators.

These figures prove the supreme necessity of the projected improvements. The lakes are closed four months out of the twelve; but the Mississippi is open as high as

Dubuque nine months in the year. Yet, notwithstanding this longer period of navigation and the continuous water carriage to Eastern markets, obstructions have almost wholly diverted the carrying trade of the Mississippi from its legitimate channel, and forced it into unnatural courses of transit. The unnecessary expense to which these impediments to navigation subject Western farmers is an oppressive tax upon agricultural industry. Agriculture is the basis of our public welfare. Upon it alone can rest an enduring superstructure of national prosperity. During the financial crisis of the late struggle, its unfailing resources alone upheld the credit of the public Treasury. Agriculture deserves the patronage of the Government. Its interests should be promoted by every aid of judicious legislation. But now, from the obstructions of navigation and the consequent want of competitive river transit, the railroad freight from the Mississippi to Lake Michigan costs more than one-fifteenth of the value of the grain. At the present price of Wheat, this tariff, on the annual shipment of 50,000,000 bushels, would amount to \$6,000,000. This yearly exaction is larger than the appropriation which Congress is asked to grant for the improvement of both rapids. The West now petitions Congress to grant relief from this hardship. An appeal sustained by such clear and imperative considerations of justice cannot be disregarded. A reduction of the cost of carriage is an object of national moment. It justly challenges the attention of statesmen; it affects the prosperity of the nation; it promotes alike the interests of the producer and the consumer; it enables the Western husbandman to make larger profits and buy more Eastern merchandise; it empowers the Atlantic manufacturer to live cheaper and sell more of his fabrics. The benefit is national.

At present almost the entire Eastern movement of cereals is carried on by way of the lakes. These Northern waters hold adverse possession of the carrying trade. The lake transportation companies have perfected all the machinery of freightage. They enjoy the advantages of long establishment, compact organization and full equipment. But, though the cost of shipment by the Mississippi is far less than by the lakes, adequate facilities for the transportation of our cereals do not exist on this river. There is no systematic combination, no means of conveyance commensurate with the wants of this Valley.

But after the construction of the canals around the rapids, floating elevators and tow-boats will soon present ample facilities for cheap transfer and water carriage. Then the active competition of rival lines of barges and propellers will reduce still further the cost of eastward shipments. This reduction in the rates of freights would be a national economy. It would lessen, throughout the United States, the expense of living. The quantity of western cereals consumed in the Eastern States is immense. New England raises only one-fourteenth of the wheat which it consumes. Not even Pennsylvania and New York produce grain enough for their own consumption. All the Eastern and Southern States are largely dependent for their supply of flour upon the cereal products of the Mississippi Valley. In 1865, the receipts at the following points were:

	Flour—bbls.	Grain—bush.
Montreal	797,657	4,116,165
Portland	547,953	2,431,733
Boston	2,193,840	3,511,750
New York	3,687,775	37,339,903
Philadelphia	724,498	4,835,785
Baltimore	996,276	6,149,660
Tide-water by canal	1,014,000	45,830,100

After the deduction of our foreign exports of grain, the amount left for Eastern consumption is enormous. Diminish the cost of carriage, and you increase the profits and lighten the toil of every workingman in the land. Every mechanic, artisan and operative in the Atlantic States would feel, in the amelioration of his condition, the beneficent effect of the contemplated improvements. The consummation of this work would enlarge the sales of every manufacturer in New England. The prime necessities of our national life are far more vitally affected by the unobstructed navigation of the Mississippi than by the security of our Atlantic harbors. Yet the government has expended millions upon the improvement of the seaboard. Numerous and liberal

appropriations have been made by Congress to insure the navigation of the lakes. Assuredly the government cannot deny to our appeal the favor which it has granted to claims of no higher obligation. One year's interest on the value of the commerce which these obstructions divert from the Mississippi would, in a single year, pay for their removal. The annual tax which the rapids levy on Western products equals the estimated cost of the proposed canals. This valley is entitled to the cheapest transportation which unobstructed water-carriage can afford. All *additional* cost of transit is an unjust discrimination against agricultural industry. The difference in the price of grain between New York and the Mississippi Valley is a dead loss to the Western farmer. The heavy rates of freight, levied both on eastward and westward exchanges, oppress the producer with a double hardship. The cost of carriage is deducted from the value of western grain, and added to the price of eastern merchandise. This two-fold grievance, of which the West so justly complains, ought at once to be redressed. Congress should confer the earliest and the fullest relief which the nature of the case permits. An adherence to its settled policy, fidelity to its responsible trusts, and its high obligation to recognize popular rights, and foster national interests, urge the government to grant the solicited appropriation.

Thus far, our attention has been mainly occupied with the consideration of a single interest. But the completion of this public work would not only affect the cereals, but every other product, of the West. While it would encourage agriculture with larger rewards, it would stimulate all industries by fostering the source of their common prosperity. It would invest the Mississippi with its rightful control of the heavy exports and imports of this valley. It would develop commercial activity, and greatly promote the interchange of productions between different latitudes. It would hasten the return of the South to its true allegiance, and bind it to the Union with the strong ties of sectional interest. It would augment our foreign commerce. It would favor the *direct* exchange of heavy commodities. In 1862, more than 80,000,000 bushels of grain, including flour, were exported from the United States. Though the effect of civil war upon our foreign commerce was disastrous, yet the value of breadstuffs exported from this country during the five years ending with 1865 was more than \$360,000,000. If the United States possessed that control of European markets which the improvement of the Mississippi and the consequent cheapness of exportation would secure, our shipments of breadstuffs would expand into far grander proportions. The profits which the Atlantic cities would derive from this enlargement of our foreign commerce is an additional reason why the East should strenuously coöperate with the West to secure the consummation of this great work.

But the West has a higher title to the favor of the government than the consideration of mere material interests. Faithful to its patriotic instincts, the West fought for the Union throughout the late contest with a stubbornness of valor that was at once a defiance of defeat and a guarantee of victory. Without disparagement to the noble gallantry of Eastern soldiers, it was chiefly due to the heroic efforts of our Western armies that the Mississippi now flows free to the gulf. Their dauntless courage prevented the rupture of our national integrity, and rescued the mouth of the Mississippi from the control of a foreign power. Their fidelity has saved the Mississippi from the vexations of hostile imposts, and permitted its waters to flow untaxed to the ocean. To their services is it to be ascribed the restoration of that unity and brotherhood for which the plastic hand of nature channeled this majestic stream. Assuredly the nation cannot forget its defenders. A government, justly sensible of its obligations, will show a practical gratitude for the preservation of its life.

The laws of trade ultimately enforce obedience. The imperial Mississippi, which traverses the central valley of this continent, and, independent of its tributaries, washes the borders of ten States, will yet assert its commercial sovereignty. The God of nature has invested this majestic stream with rights of conveyance which no railroad powers of attorney can transfer. The title of the Mississippi river to the commerce of this valley is attested with the divine signature. The productions of the West will be borne to the tide-water through channels which the Architect of nature formed. Our

Western rivers will soon transport a greater wealth of traffic than ever before floated on inland waters.

The usefulness of the projected improvement will increase with the growth of the Mississippi Valley. The following table shows the population and grain crop of the eight Northwestern States during the last three decades :

Years.	Population.	Bushels.
1840	3,340,500	165,698,800
1850	5,403,600	310,950,300
1860	8,855,900	556,801,900

The Agricultural Bureau, basing its calculations on past results, makes the following approximate estimate of the cereal product of the Northwest for the next four decades :

Years.	Bushels.
1870	762,200,000
1880	1,219,520,000
1890	1,951,232,000
1900	3,121,970,000

These numbers indicate a vastness of agricultural production and commercial exchange which the mind fails to grasp. Our conceptions of the future greatness of the West are rather embarrassed than aided by these figures. In the coming time, tens of millions will throng this valley under the benign sway of one government. All the prosperities of a free people and a Christian civilization will gladden this land. Our waste territories will become populous States. The resources of the soil and mine will be developed. Our wealth of agricultural and mineral productions will enrich the world. In that day the Mississippi will bear upon its bosom a commerce richer than the golden freights of classic story, and vaster than the maritime trade of any people on the globe. Our government ought at once to prepare the Mississippi for its glorious destiny.

At the conclusion of the paper read by Professor Waterhouse, the President submitted the following letters, which were read by the Secretary :

PRESIDENT'S OFFICE, PACIFIC RAILROAD,
St. Louis, February 13, 1867.

Hon. William M. McPherson,
President of the Mississippi River Convention.

Sir:—On behalf of the Pacific Railroad of Missouri, I tender the civilities of the road to the members of the Convention.

Orders will be issued to the Conductors instructing them to pass such members of the Convention as may present the certificate of the Secretary.

Very respectfully yours, &c.,

GEO. R. TAYLOR, President.

OFFICE ST. LOUIS AGRICULTURAL AND MECHANICAL ASSOCIATION,
Lindell Hotel, Block No. 14, February 12, 1867.

Mr. Wm. M. McPherson,
President of Mississippi River Improvement Convention.

Dear Sir:—Allow me to present to you, for distribution to the members of the Convention, of which you are President, copies of an essay written by Mr. John Magwire for the St. Louis Agricultural and Mechanical Association, showing the advantages and adaptability of St. Louis as a manufacturing city for all articles now manufactured in other cities of the Union.

You will confer a great favor to our Association by calling the special attention of the members of the Convention to the importance of said essay.

Very respectfully yours, &c.,

G. O. KALB, Secretary.

Mr. Ingersoll, Chairman of the Special Committee appointed to wait upon the Committee on Resolutions, reported that the committee had

informed them that they hoped to be able to report at three o'clock. They also requested that any delegates having any resolutions which they had prepared on the subject now before the Convention would submit them to the committee.

James L. Faucett submitted a resolution for the appointment of a committee of two members from each State represented in the Convention bordering on the Mississippi river and its tributaries, to memorialize Congress on the subject of levees along the Mississippi river and its tributaries subject to overflow. Referred to the Committee on Resolutions.

The Convention then adjourned until three o'clock P. M.

W. B. Baker, Secretary of the Executive Committee, announced that a dinner would be given to the members of the Convention, at the Lindell Hotel, at eight o'clock, to which all members were invited, and tickets would be furnished during the afternoon.

AFTERNOON SESSION.

At three o'clock P. M. the President called the Convention to order, and submitted the following letters, which were read:

LETTERS TO THE CONVENTION.

HOUSE OF REPRESENTATIVES,
WASHINGTON, D. C., February 8, 1867.

John How, Gerard B. Allen, and others, Committee.

Gentlemen:—Your favor of recent date, inviting me to attend the proposed "River Improvement Convention," to be held in the city of St. Louis on the 12th instant, has been received. I regret to say that my duties in Congress are such as to render it impossible for me to be present; but I beg to assure you that any measure for the improvement in the navigation of the Mississippi river and its tributaries shall have my cordial support, in and out of Congress. I feel that I appreciate the paramount importance of this subject as most deeply affecting the vital interests of the great West. I have only time to add that I hope the day is not far distant when you may behold the final consummation of the purposes contemplated by the Convention.

I have the honor to be, very respectfully, your obedient servant,

E. C. INGERSOLL.

WASHINGTON, February 8, 1867.

Messrs. John How and others, Committee of Invitation, &c.

Gentlemen:—Yours of the 1st instant, inviting me to be present at your "River Improvement Convention," has been received; and the deep interest I feel in everything pertaining to the Mississippi river makes it peculiarly unpleasant for me to have to say it will be out of my power to be present.

From childhood I have entertained a feeling of admiration for the "Father of Waters," which, during our past struggle, has increased to affection. It being clear to my mind that its influence in perpetuating the Union has been greater than that of a quarter of a million of men; and I have often been constrained to say: Had the course of this grand river been across the continent, instead of as it is, thus dividing the North from the South, rather than uniting them, a division of the States, with it as the boundary, might have been accomplished.

Entertaining these sentiments relative to its national influence, and as fully appreciating its commercial importance, I deem it the first and one of the highest duties of the

nation to remove every obstruction and overcome every obstacle to its *uninterrupted* navigation from the Falls of St. Anthony to the Balize. And while I sincerely regret my inability to be present at your Convention, I beg to assure you that I am ever ready, to the extent of my ability and influence, to aid in the accomplishment of the result indicated.

With a desire that your Convention will be interesting and beneficial, I beg to remain yours, with respect,

JOHN W. LEFTWICH, of Memphis, Tenn.

Mr. Cook, Chairman of the Committee on Resolutions, presented the report of the committee, and made the following remarks :

Mr. President and Gentlemen of the Convention: The Committee on Resolutions having honored me with the position of Chairman, I report the following resolutions. Before reading them, it may be proper for me to say that, at the first meeting of the committee, it was found that there had been prepared no resolutions, nor any sketch or draft of such drawn up. We came together, Mr. Chairman, without having any expressed opinions on the subject of the proposed resolutions to be presented to the Convention. As a matter of course, there were a great variety of propositions made; all of them were duly and carefully considered, and were ably discussed and supported there before the committee. The committee, however, feeling that this Convention had been called for the purpose of securing those improvements, which were of great importance — of great national importance — unanimously agreed upon the following brief report:

RESOLUTIONS.

In order to bring before this Convention the distinct propositions to be considered, your committee recommend the following:

Resolved, That the interests of the whole Mississippi Valley require the immediate improvement, by the National Government, of the Mississippi river, from Balize to the Falls of St. Anthony, including, especially, the bars at the Balize, the Upper and Lower Rapids, and the removal of obstructions above those rapids; and also of the Ohio river from Cairo to Pittsburgh, and especially the work at the Falls of the Ohio; said improvements to secure the navigation of said rivers free from all tolls or tribute.

Resolved, That the vast importance of such action as will secure the needed improvements, at an early day, of the following rivers, is commended to the favorable and earnest consideration of Congress, viz: The Missouri river from its mouth to Fort Benton; the Illinois river; the Red river; the Tennessee river to Chattanooga; the Wisconsin and Fox rivers; the Arkansas river to Fort Smith; the Cumberland to Nashville.

Resolved, That when the financial condition of the country may justify, Congress be requested to cause proper investigations to be made as to the necessity of improving hereafter all the other navigable rivers of the Mississippi Valley.

Resolved, That Congress should legislate on the subject of bridging the Mississippi and other navigable rivers of the United States, as will, while recognizing the equal importance of railroad and river transportation, harmonize those interests, by securing proper facilities for both.

Your committee recommend, in furtherance of the following objects, the appointment of a committee consisting of one member from each State represented in this Convention, with a sub-committee of five, to prepare a memorial to Congress demonstrating the national importance of said objects, and that each member of said General Committee report to said sub-committee such statistics as will facilitate its work. It is further recommended that the resolutions adopted and the memorial be forwarded to Congress, in the name of this Convention, by its President, and that copies thereof be furnished each Senator and Representative from the States of the Mississippi Valley.

A motion was made to adopt the resolutions.

Mr. Eads, of St. Louis. Before that motion is put, I desire to offer an amendment to the report. The Missouri river, the great water highway to the Rocky Mountains and the Pacific slope, is left in the report as a secondary matter. The Falls of the Ohio, and the bar at

the Balize, and the improvement of the Mississippi river to the Falls of St. Anthony, are spoken of as matters of imperative necessity. The Missouri river, thirty-one hundred and fifty miles long from here to Fort Benton, on which millions are lost annually, will require an appropriation of probably five hundred thousand dollars annually to improve it; and some snag-boats used on the Mississippi at certain seasons of the year, which are useless there, can be used to the utmost advantage on the Missouri; and I think it is not proper that the Missouri, which is part of the Mississippi proper, and much the larger part, should be left in this manner.

The President. The question is upon accepting the report of the committee.

The report was accepted, on motion of James L. Faucett.

The President. The question now is on the adoption of the resolutions.

Mr. Skinner. I move they be adopted.

Mr. Eads. I think our success for the improvement of these great rivers lies in our unity of action—in the concentration of the influence of the people of the Mississippi Valley to carry out this measure; and if they are afraid to go before Congress and ask for five hundred thousand dollars to improve thirty-one hundred miles of river, upon which millions and millions of wealth is transported—the great natural water highway to the Pacific—I think we had better give up this thing at once in despair. It is as worthy of being enumerated among the immediate interests of the Government as the Falls of the Ohio, the bar at the Balize, or the improvement of the Mississippi river from here to the Falls of St. Anthony. Therefore, I move that the Missouri river be placed on the same footing with these other improvements.

Mr. Faucett. I second the motion, and move that we also add the American Bottom from Alton to Cairo.

The President. The improvement of levees is not now under consideration.

Mr. Faucett. We are in favor of the navigation of the river; at the same time, we are in favor of protecting the people from overflow.

The President. The amendment is not in order. The question before you is the amendment proposed by Captain Eads.

Mr. Skinner. I move to amend it by adding also the Illinois river.

Mr. Eads. I hope my amendment will stand on its own merits and be voted on alone. I am willing to vote for the improvement of the Illinois river; but I don't want it to hamper this great stream by letting in other questions that will involve the liability of defeating it.

Mr. Skinner, of Quincy. The committee have endeavored to arrive at a conclusion in a harmonious manner, and if it is designed to tack upon the labor of the committee the improvement of other rivers, I urge also the inclusion of the Illinois. The gentleman speaks of the magnitude of the interests involved in the Missouri river. He may recollect that the State of Illinois, in its infancy, became largely in-

volved, and advanced large sums of money upon the improvement of its rivers, and Illinois bears the burden to-day of a State debt arising out of her energy and perseverance in creating a great national highway to the Gulf. The Missouri river has not been improved by the State of Missouri; the National Government has, to a greater or less extent, I believe, improved its navigation. I do not question the propriety and the necessity of the National Government taking up the question of the improvement of the Missouri river; but if the question must come, I insist that, in justice to the State of Illinois, to the vast lake regions and the Lower Mississippi, of which the Illinois and Michigan canal and river form connecting links and continuous water navigation to the ocean, that my amendment shall be entertained.

Mr. Truesdale, of Rock Island. While I recognize the force and power of the argument of the gentleman moving the amendment to this resolution, and the amendment to the amendment, and while, as a matter of course, I would favor any appropriation for the improvement of the Illinois river, yet I think, in consideration of the interests of all concerned in this Convention, that we should confine ourselves, at this time at least, to asking Congress to make an appropriation for the main artery of all this system of internal navigation. I now move that the whole subject, the amendment and amendment to the amendment, be laid on the table.

The President. I am afraid that will carry the whole subject with it.

Mr. Truesdale. I move, then, the rejection of the amendment.

Mr. Eads. Before that question is put, I hope the great Missouri river will be considered on its sole merits, without endeavoring to tack upon it anything else, and especially a river that lies wholly within one State, two hundred miles long, while the Missouri river is three thousand one hundred and fifty miles in length. It certainly is proper to ask an appropriation for its improvement. Other rivers have been included, the improvement of which is not so imperative as it is upon this mighty stream. I hope the amendment will not be rejected, but will be considered upon its sole merits.

Mr. Stanard. I believe there is enough in the resolutions which have been offered in your hearing. I believe, gentlemen, that you will all bear me out when I say that the appropriations for the improvement of the rapids of the Mississippi have always been killed in Congress by trying to tack too many things together at once. [Applause.] This question of improvement of the rapids has been agitated ever since I was a boy; every time matters of this kind came up, the Illinois river, the Missouri river, or some other river, or some other enterprise, had to be tacked to it. The result was that the whole scheme was lost, money was squandered, time was lost, and nothing was accomplished. The design in calling this Convention together, at this late day, (it should have been called thirty years ago, and the appropriation had,) was that we might get a start in the right direction. It is believed by all practical, clear-minded men—merchants

who are advised on this subject—that the improvement of the Rock Island and Keokuk rapids is a matter of the most paramount importance of all the improvements needed in the great valley of the Mississippi. [Applause.] My idea, gentlemen, is, that we should present this matter upon its own merits—[applause]—and get the appropriation, and get the work accomplished. Let the people of the valley of the Mississippi, and of the balance of the rivers, say that, and Congress will be disposed to make an appropriation for a great and important work. This being done, it is a very easy matter, if it shows itself of any importance, and if these resolutions are productive of any good, to get an appropriation for the improvement of the Missouri and Illinois rivers. We are not opposed to those things; but, gentlemen, we want this matter to go on its own merits, so that it will be accomplished. It does us all good. We all reap benefits from it. But I am afraid that if we undertake to do too much, we shall lose it all. Like the child that undertakes to walk, it is enough at first to take the first step, then another, and so on, until the child can run. It does seem to me that this is a practical question, as is also its exposition here. I do not pretend to make speeches, or to dictate to any of you. I am anxious that nothing shall be tacked to this matter that will kill the enterprise. [Applause.] It will be time when we get this appropriation to make an effort for another, in order to carry out other contemplated improvements. Let us do one thing at a time. I did not hear the whole of the resolutions read, but from what I did hear of them it seems to me that there is enough embraced in them, and I am afraid too much. [Applause.]

Mr. Eads. If the Convention will bear with me for one moment, my object is to give strength to this amendment, not to weaken it. The gentleman alludes to the improvement of the rapids in the Mississippi river. If he was as familiar with that subject as I am—and no man can be more alive to its improvement than the honorable gentleman and ex-President of the Chamber of Commerce, who has just addressed you—he would know that it is the object to combine our forces so that we can accomplish our object. It is by concentrating all the influences together that we hope to carry these measures; and if we include the Tennessee and its tributaries, it will not impair the great object which we have in view. We do not go against the improvement of the Illinois, or of any of these other streams; but this Missouri river, three thousand one hundred miles in length, should certainly have an appropriation. I believe that it demands immediate improvement.

Mr. Richards, of Iowa. I am sorry to occupy the time of this Convention, but I feel alarmed at the motion that has been made by the very eloquent and distinguished gentleman of this city. Now, I beg, gentlemen of the Convention, if you will listen to me for a few moments, to go over the history of the improvements of the Upper Mississippi, and it will be an exceedingly brief history, only barely to

name the fact that they began these improvements of the rapids of the Upper Mississippi some thirty years ago, when the General Government acknowledged it as a national work, and at a time when there was scarcely a white man on the upper river. There were plenty of men then who said it could not be a work of national importance, for if you improve the navigation of the upper river, they said, you have nothing to bring down; and consequently it has been for a whole generation lagging and waiting for the development of the country on the Upper Mississippi. Ten years ago Minnesota imported the grain to feed her people. To-day she exports ten millions of bushels of wheat, [applause,] and a good crop, they say, this year will enable her to give fifteen millions of bushels of wheat to the commerce of the United States. Iowa scarcely falls behind, and will largely add to that in corn and oats. Wisconsin (Western) will come in, so that you will have in the tributaries of the Upper Mississippi a surplus the coming year of not less than thirty million bushels of wheat, and an equal amount of the other cereals, seeking a market either South or East.

Now, these huge aggregates, and the wants of the agriculturists in this great upper delta, demand, with a voice that will not drown, the improvement of the rapids—of the upper and lower rapids of the Mississippi. Now, I beg gentlemen who ask for this amendment to consider that there is at this time a great struggle going on—a war of giants, and that we are in the busy whirl of that war, and where the battle rages most fiercely. It is a war where on one side is arrayed wealth, and an aggregate of \$500,000,000, that can combine as one man in the lobby of the Legislature in your national capital. It is a war of monopoly, of artificial communication against the free highway that an all-beneficent God has made to this people. The railroad men—God forbid that I should say anything against them—they represent fifteen hundred millions of the capital of the country; these roads are the proudest monuments of the genius of American enterprise and skill and perseverance. They have tunneled mountains, bridged streams, have made distant lands near. They are the most princely means of passenger conveyance, and excellent means of freight conveyance, and I would not belittle them. We honor them and invite them into our own State of Iowa, by a liberal legislation and a light taxation. We need them to develop our State. But I beg you to remember that, although they are to be honored, yet they are at least monopolists—that they are at least creatures such that they can combine against the sheep of the flock—the virtuous agriculturists of the land—the staple and the hope of this people, its defense in time of war, and the nursery of manhood and womanhood true and pure of the land in time of peace. I say that the fact that the sheep of the flock cannot combine against these monopolists is one of the strongest arguments for urging the improvement of the Mississippi rapids. For when you have made that improvement, you have given

it forever to the people free, and no combination of men can then unite so as to rob the farmer of half of his toil.

Now, this war is going on as I have said, but the railroadmen will tell you that "we work on parallels"; that means by the help of the capital of the Northeastern part of this country they can drag everything from the Rocky Mountains to the Atlantic, and this capital has its great representative on the lake—the great metropolis of the lakes—Chicago. We know that she controls a large aggregate of capital in railroads, in banks, in manufactories, that is tremendous when it unites against the interests of our agricultural population; and they say, "will you undertake to oppose, by legislation in your State or elsewhere, a capital of five hundred millions of dollars that can be brought against you?"

We say, in the name of every farmer on the remote frontier, of every man who holds a plow, that, so sure as he has a vote, we will oppose all this capital, and all this monopoly, in the name of the mass of the people, and we will triumph when they are aroused. I want to say further, though, just at this point, that the war is against this river—the discriminations are against this upper river. There lies the great body of the cereals—there is the prize that the railroads and the capital of the East are contending for against the free transit to the gulf. The river here runs to the South; the railroads are running to the East and West. We want to answer to the railroads that work on parallels; we want these railroads up to a certain point; we honor and invite them; but when they conspire to deter the improvements of this river—when they discriminate against the men who live on its banks—when they attempt to control all its commerce themselves, they rob the people that live on either side of it [applause]; and we call them by their true name, robbers! and not friends!

Now, I say, this struggle is going on, and we are in the midst of it. I beg gentlemen, in this crisis, and at this time—I beg them to strike only for triumph at the vital point. I want to say to the eloquent gentleman from St. Louis and all others, that if you can triumph in this instance in securing a free navigation, over monopolists and over railroads; that if we can secure a Southern transit over an Eastern transit, the battle is won, the centre is broken, and the enemy is routed. We are the friends of every river improvement. To statesmen, and to men who think there is not a danger in this government greater to-day than the combination of capital concentrated in railways, banks, and manufactories. There is not to-day a greater danger to the corruption and the overturning of the government than that. Why, gentlemen gravely propose, that, on account of monopolies in express companies, and monopolies in telegraph companies, the government should take in hand these companies, and give us the telegraph as they give us the mails, and give us express companies as they give us mails. Let the combination of railroads go on; let their power increase—they will fix a tariff as inflexible as iron. When they choose to make a tariff to rob

you of half the profits of your toil, as long as you commit yourselves to their keeping, they will have the half of your toil. Now, at this juncture, we can put a check upon this, and the most productive regions of the United States can be delivered from the power of these monopolists, by giving them an improvement that will cost only one quarter, at a low estimate, of what we lose every year for the want of it. Now, this is your most favorable point to make the stand. I beg of you to make the stand here; and if single in your purpose, and united in that one grand object, so much the more likely are you to succeed. These are the views that I believe are entertained, nearly without exception, among the delegates of our own State, a very large part of Missouri, and a portion of Illinois and Wisconsin, I am sure. It is true, we are more interested than you in that immediate improvement; but if you will clear out these rapids at an expense of five million dollars, you will have added to the wealth of the upper country twenty-five cents per bushel upon sixty million bushels of grain, and you have further compelled the railway companies to lower their tariff; and I have the figures to demonstrate beyond a doubt, also, that you will have added this to the capital of the upper country, and put it in the pockets of the agriculturists. Having done this, you have touched with new life the whole commerce of this valley, and added immensely to the growth of your cities and to your manufactures, and you have married together indissolubly the commerce of the South and the commerce of the North, [applause] a commerce that is national and will last a thousand years, There is nothing that New England makes to-day that Minnesota may not make to-morrow; but Louisiana and Mississippi grow to-day what we cannot grow in the North, and for a thousand years they will continue to grow the products that we want, and we will continue to grow the products that they want. God made this great river to run north and south rather than east and west, that the exchanges of the different latitudes might be forever floated on its bosom.

Now, some men but little familiar with figures perhaps, and a little doubting, may ask me: Why don't you do to-day what you say can be done if this improvement were made? The answer is: It costs from thirty to one hundred thousand dollars to construct the towboats and barges necessary to carry this commerce, and you cannot afford to spend thirty or fifty or a hundred thousand dollars in the construction of boats when you can make but two trips in a season on account of low water. Hence, these rapids are a perpetual dam to this cheap transportation. I know numbers of men who would be ready to invest their money in this enterprise, if they were only sure the rapids would be improved, so that they could go to New Orleans without the fear of being caught by low water, and thereby prevented from returning.

Now, gentlemen of the Convention, I beg your pardon for occupying your time so long. I have spoken somewhat at length, and earnestly, because our enemies—and they are no less than our enemies—men who do not want the Mississippi river navigable, who secretly oppose it in

Congress and out of Congress, and boast that they can defeat it altogether—yes, they do boast of it, and I have got the proof that responsible men—men of means and energy—intend to make good their threat. They do not openly oppose it, for they fear a war in the State Legislatures of the North. They secretly oppose it, but once in a while their passion gets the better of their judgment, and they boast that they will defeat the project. Now, will you gladden these enemies by tacking on every river where the country is not developed, where the population has not gone. Why, there is not produce enough above Sioux City to feed the Indians, to say nothing of white folks. Why insist on tacking on rivers that have no commerce developed, and which will insure the defeat of the whole measure? Our enemies desire nothing so much as that we should commit this folly—to ask so much that it will break down of its own weight. This Convention is evidence that we have a deep interest and anxiety for the success of this measure. Why do we not hear something more about it in Congress? Not a single earnest speech have we heard in reference to this matter. Oh, that we had some fanatics in Congress upon this subject—[laughter and applause]—that would not let it rest until justice was done to this people, and though voted down an hundred times should yet again propose it on the first opportunity, never yielding until success was won. [Loud applause.]

Mr. Eads. I had hoped to place the importance of the improvements of the Missouri river more prominently before Congress than these resolutions will do, but for the sake of harmony I propose to withdraw the amendment which I offered.

Mr. Goshorn. I have been a silent observer of passing events in this hall. I have not trespassed on your time for a single moment, nor would I do it now unless compelled; but, sir, when I listen to that proposition as introduced here in the shape of an omnibus bill to go before the Congress of the United States, I feel bound to speak. I think it will suffer the fate of all bills of a like description for the last five years. Mr. President, for the last ten or fifteen years we have been making vigorous efforts to improve the navigation of the two rapids of the Mississippi river, and some \$600,000 have been spent to improve the lower rapids of that river. And now, sir, if an examination is made at this day, at this present moment (as a river captain yesterday informed me) there is less water on the upper chain now than when the improvements there were first commenced. The effort was made by digging out the channel, and the impossibility of such an improvement has been perfectly demonstrated; and last winter when a proposition was introduced into Congress for the purpose of improving the rapids of the Mississippi, the Fox river, the White river and the Wisconsin river were also added to it, and the friends of the bill turned on it and destroyed it. What proposition of a local character could have brought this Convention here? Suppose the merits of Fox river had been up—and I am not denying that they are great—would many of the delegates from Illinois, Nashville and the banks of the Ohio have been here? They would not, sir. I want to

obtain some expression of the opinion that brought us here, and I have introduced an amendment. It is this :

“That the improvement of the two rapids of the Mississippi are of primary importance and more imperatively demanded at the present time than any other, and that their success or failure to stand or fall should depend on their own merits or demerits, unconnected with all other propositions.” [Applause.]

After having moved that amendment, I can go home and face the constituency that sent me here. It is the object of my being here. I simply want the amendment to stand or fall on its own merits, and not to be a scapegoat to carry out the sins of all the rivers in the country.

The first resolution was then read.

Mr. Goshorn resumed his amendment.

Mr. Bryson. I have no objection to the gentleman offering such a substitute if the only object is to relieve his conscience so that he can go home to his constituency. [Laughter.] But that this shall be appended to the resolutions we have before us now, as coming from an independent committee, I have serious objections. I am astonished that the delegates from the northern Mississippi should here to-day hope, by appending such a thing, to succeed in any measure whatever. The gentleman who argued so eloquently and ably in behalf of this object acknowledged that the great battle between the West and East must be fought with a capital concentrated against us upon the northern lakes. And does he then hope by taking a single local interest into Congress, that he can enlist the men of Pennsylvania, of Ohio, of Indiana, of Tennessee, of Mississippi, of Louisiana, of Missouri and part of Illinois? [Applause.] I am astonished at the gentleman. Only about four months ago the Hon. Major General Schenck of Ohio said to me, “we fought the battle last year in Congress, and the first battle in which the West really succeeded in contending with the East, and we only succeeded through the aid of Pennsylvania.” Now, to come up and fight a great battle against the interests of the great West, and ask our representatives that the limited interest of one local section, embracing—as I have statistics taken from statistics of 1866—only about one-fifteenth of the population of the entire Mississippi valley, and only about one-sixth of the products of the Mississippi valley—to ask that single local interest to fight the great battle, and to expect that men will stand up and fight it bravely—I cannot hope for such a thing, and I will not go and ask these men of Tennessee and Kentucky, the men of Ohio, the men of Indiana, and especially Pennsylvania, to come and stand by it, unless I shall embrace all that the committee has embraced. The question is not merely a local question. They say it is an omnibus. Very well, we want to take the able men from every district where we can find them, and induce them to stand up and fight this battle. If they want to go with a one-horse conveyance, let them do it. I say, as I said in the beginning, I am astonished. I have no objection to the gentleman relieving his conscience in that way, or in preparing himself to face his constituency ;

but I do not want, sir, that this Convention, in the success of the commerce of the great West, shall to-day destroy its main adherents by bringing to a single local interest what should be extended to the general channel. I am astonished at another point. It is not true that these interests are paramount to all others. It looks like a man commencing to dig a ditch to drain a country by beginning at the upper end first. We know, sir, that the bars at Balize that prevent us in the West from competing with New York in the commerce with Europe, is the main obstacle to our success, and no man can gainsay it. Let us make it so that the great ships, carrying three or four thousand tons, can go through and bring their cargoes back, and we have then made it easy for the great West to stand up and do its own work. And now let us look at another interest. We must, in order to enlist Ohio—and is not Ohio, as a grain raising State, to be considered in connection with a territory which has already been spoken of, and Indiana and Pennsylvania?—we must connect with these and consider of equal importance the passing of the rapids of the Ohio. We must hold that up as an equally important question. I say, then, that I hope this pending amendment may be voted down.

Mr. Cook of Ohio. It was considered unanimously in the committee that framed these resolutions that the work of improvement in the falls of the Ohio river was one of equal importance, at least with the improvement which it is supposed to make on the rapids of the Mississippi; and yet had it not been for the last gentleman who has just spoken, the Convention would scarcely have known that there was a navigable stream called the Ohio river. [Laughter.] But I trust that those gentlemen who insist so strenuously for the improvement of their own river, will not think I speak at random when I say that we have a commerce passing the rapids on the Ohio river equal to three times the commerce passing the rapids on the Mississippi. We have one article of commerce upon our river which passes these rapids—the article of coal—twenty millions of bushels of which is equal to twenty millions of grain, if not in value, at least in the necessity which demands its transport below these falls. Now, we ask that the improvement of the falls at Louisville shall stand in equal importance to that resolution which may be adopted by this Convention, together with the improvement of the rapids of the Mississippi.

I would say one word with reference to the Congressional influence it is proposed to bring to bear on this matter. We all know how difficult a matter it is to get an appropriation in this Congress for those Western and Southern rivers. The gentlemen who argue so strenuously for the Mississippi, putting it in the front of everything else, seem to forget that the waters of the Ohio river wash the shores of six of the greatest States of this Union. [Applause.] They seem to forget that if Pennsylvania, if Virginia, if Ohio, if Kentucky, if Indiana, if Illinois do not aid them, they cannot get anything from Congress. I ask them, therefore, to let this resolution stand as it is. We upon the Ohio have

suffered a tax upon our commerce for the last forty years. Private enterprise, the government being a partner as a stockholder in that enterprise, secured the building of a canal around those falls; but experience has shown that it is totally inadequate to the commerce of that river. The enlargement of that work was commenced some five years ago, and has been prosecuted until a year or year and a half ago, when it was abandoned for the reason that there was no more money to be obtained for the work.

Mr. Goshorn, interrupting. If the gentleman will allow me, at the instance of friends, I will withdraw my amendment. [Loud applause.]

The first resolution was then adopted, there being but one dissenting voice.

The remaining resolutions were then read *seriatim*, and adopted without debate.

Mr. Cook, of Ohio, said there was large number of papers, including valuable statistics, presented to the Committee on Resolutions, which, of course, the committee had not time to examine and report upon. It is proposed by your Committee on Resolutions that these statistics and papers shall be handed to the Committee appointed on Memorial.

The papers and statistics alluded to by Mr. Cook were accordingly referred to the Committee to prepare memorial to Congress.

The Convention then took a recess of fifteen minutes.

After the recess, Judge Treat moved that a committee be appointed of one from each State, to prepare a memorial to Congress, which was afterwards amended, giving that committee power to appoint a sub-committee of five, as a medium through which the resolutions on the memorial should be presented to Congress. The Chair announced the following gentlemen as the Committee on Memorial:

COMMITTEE ON MEMORIAL.

Capt. W. H. Harrison, of Nashville, Tenn.; B. B. Richards, of Dubuque, Iowa; Chas. H. Meekin, of New Albany, Ind; Theodore Cook, of Cincinnati, O.; L. P. Weatherby, of Wisconsin; B. C. Levi, of Kentucky; Theodore W. Buddecke, of Louisiana; Col. John Dougherty, of Illinois; Henry M. Rice, of Minnesota; J. M. Knapp, of Pennsylvania; Chas. L. Tucker, of St. Louis, Mo.

After some further debate, it was decided that the sub-committee of five should be located at St. Louis. The President stated that the committee would be announced in the morning papers.

Mr. Ingersoll stated that he desired to present the claims of the Minnesota river in this Convention, but was unwilling to trammel the objects before the Convention with others than those absolutely necessary. He would, however, desire to have the Minnesota river placed in a second-class. That river floated 4,000,000 tons, and by a small expenditure, it could be made navigable for 400 miles.

The Chair decided that the proposition could not be entertained.

A delegate moved that Rock river be inserted also, but, not wishing to disturb the harmony of the Convention, withdrew his motion.

Mr. G. B. Allen introduced a resolution that the Convention recommend to Congress an appropriation of \$4,000,000 for the improvement of the Lower Mississippi at Keokuk; also that an appropriation of \$1,000,000 be made for the improvement of the Upper Rapids at Rock Island.

Also, an appropriation of \$2,500,000 for the improvement of the falls of the Ohio river.

Also, an appropriation of \$2,000,000 for the improvement of the Mississippi river, including the Balize.

The discussion upon Mr. Allen's resolution tended to bring out new matters for discussion, and the Convention not wishing to get to sea again, but believing that they had accomplished their purpose in the adoption of the resolutions and the appointment of a Committee on Memorial, Mr. Allen withdrew his resolution with the understanding that the Committee on Memorial would present such statistics and recommendations as would best accomplish the objects of the Convention.

A delegate from Minnesota moved that the thanks of the Convention be returned to the President and the officers of the Convention for the able manner in which they had discharged their duties.

Judge Treat moved to include the President, *pro tem*.

The resolution as amended was unanimously adopted.

Mr. Skinner moved that the thanks of the Convention be returned to the citizens of St. Louis, for the courtesy and kindness tendered to the different delegates.

A vote of thanks was also tendered to the Mercantile Library Association, for granting the use of their Hall for the sessions of the Convention.

Mr. Ingersoll moved a vote of thanks to the different railroads who had granted half-fare tickets.

Mr. Skinner moved a vote of thanks to the press and reporters.

On motion of Mr. G. B. Allen, the Convention then adjourned *sine die*.

The following is the sub-committee of five on memorial to Congress from the River Improvement Convention:

SUB-COMMITTEE ON MEMORIAL:

E. O. Stanard, Joseph Brown, E. W. Fox, G. B. Allen, James F. Griffith.

PROCEEDINGS OF THE CONTINUING COMMITTEE.

The following named gentlemen were appointed at the recent River Improvement Convention as a Continuing Committee of one from each State, viz.:

Henry M. Rice, residing at St. Paul, Minnesota; L. P. Weatherby, Hudson, Wisconsin; B. B. Richards, Dubuque, Iowa; John Dougherty, Jonesboro, Illinois; Chas. L. Tucker, St. Louis, Mo.; Chas. H. Meekin, New Albany, Indiana; Theo. Cook, Cincinnati, Ohio; J. M. Knapp, Pittsburg, Pa.; B. C. Levi, Louisville, Kentucky; H. H. Harrison, Nashville, Tenn.; Theo. W. Buddecke, New Orleans, Louisiana.

Pursuant to notice, the above committee met at the office of the St. Louis Merchants' Exchange on Thursday, the 14th of February, 1867, and organized by calling Charles L. Tucker, Esq., of Missouri, to the chair.

The President of the Convention, Wm. M. McPherson, Esq., reported that he had appointed the sub-committee of five as follows, viz., E. O. Stanard, Joseph Brown, E. W. Fox, G. B. Allen, James F. Griffith, St. Louis; and that the President of the Convention, as *ex officio* officer, a member of the committee, was requested to receive charge of communications to it.

On motion, it was ordered that, for the purpose of concentrating future statistics and information, all pertaining to the Ohio river should be collected through Theo. Cook, Esq., at Cincinnati, Ohio; all relating to the Lower Mississippi and the Balize, through Theo. W. Buddecke, at New Orleans, La.; and all pertaining to the Mississippi above Cairo, through Chas. L. Tucker, of St. Louis, Mo., where they shall be combined, together with those from Cincinnati and New Orleans; and it was further ordered that parties in each division as named above be requested to communicate information pertinent to the subjects to the respective points indicated.

. On motion of Mr. Cook, of Ohio, it was

Resolved, It is requested that the memorial to Congress, to be prepared by the local committee at St. Louis, shall embrace the general propositions contained in the resolutions adopted by the Convention, and none other.

On motion of Mr. Cook, of Ohio, it was

Resolved, That the delegates to the Convention be requested to present to their respective boards of trade, chambers of commerce, or other commercial organizations, the proceedings and resolutions of this Convention for the purpose of securing an

indorsement by such bodies of the action of the Convention, which indorsement to be also speedily forwarded by their respective bodies to their representatives in Congress from their several States.

On motion of Mr. Richards, of Iowa :

Resolved, That the sub-committee at St. Louis be requested to prepare their memorial to Congress immediately, with such statistics as they are able to gather, and to send the same to the present Congress as soon as prepared, by such competent person or persons as they shall select, whose duty it shall be to endeavor to secure in the appropriation bill now before Congress the amounts necessary to accomplish the objects named in the memorial.

On motion of Mr. Cook, of Ohio, it was

Resolved, That the Committee on Memorial be requested to send to the various boards of trade and chambers of commerce a copy of the memorial and the proceedings of this committee, and request that such boards of trade or chambers of commerce designate a suitable person to visit Washington, to urge upon Congress the appropriations necessary to carry out the recommendations.

On motion of Mr. Dougherty, of Illinois, it was ordered that Charles L. Tucker, of Missouri, be appointed permanent chairman of this committee with power to call on its members for statistics and information, and to call the committee together when deemed desirable.

On motion, the proceedings of this Convention were ordered to be published, and also to be furnished to the Memorial Committee for incorporation as ordered above.

On motion adjourned.

CHAS. L. TUCKER, *Chairman*.

PROCEEDINGS OF THE SUB-COMMITTEE ON MEMORIAL.

The Committee on Memorial to Congress met according to appointment at the Union Merchants' Exchange in St. Louis on the 23d of February, and reported the following

MEMORIAL TO CONGRESS ON THE SUBJECT OF RIVER IMPROVEMENT.

To the Congress of the United States of America:

Your Memorialists, appointed at the River Improvement Convention, held in St. Louis, February 13th, 1867, would respectfully represent:

That the States lying upon the banks of the Ohio and Mississippi rivers, fourteen in number, had, by the census of 1860, a population of 16,909,494, or more than half the whole population of the United States; and these two rivers have a coast line of 36,098 miles, while the coast of the Atlantic is 2,163 miles, and the Gulf of Mexico 1,764 miles, and of the Pacific 1,343 miles, on an outer line, or 21,354 miles including bays and indentations.

That these rivers drain an area of 1,785,267 square miles, more than half of the whole 3,001,002 square miles in the United States; and these fourteen States, in 1860, contained 94,402,869 of the 163,110,720 improved acres, and 126,703,393 of the 244,101,818 unimproved acres of the whole United States; and the valuation of property in these fourteen States shows 8,467,511,274 dollars of the whole valuation of the United States, 16,077,358,715 dollars; showing very conclusively that these fourteen States pay more than half the taxes, work more than half of the improved land, have the majority of the population, and also the majority of the land to develop, of the whole United States.

By the census of 1860, the whole product of the United States was valued at \$1,900,000,000, while the foreign exports of domestic produce were only \$373,189,274, or less than one-fifth of the whole product, leaving four-fifths for exchange in domestic commerce between the States.

The proportion of the whole product afforded by these fourteen States we speak for, may be judged by these returns of their produce, gathered from the census of 1860, and compared with the whole United States, as follows:

	The fourteen States.	The whole United States.
Corn.....	632,454,375 bushels.	838,792,740 bushels.
Wheat.....	126,930,730 "	173,104,924 "
Oats.....	103,995,461 "	172,643,185 "
Tobacco.....	345,400,759 pounds.	434,209,461 pounds.
Sugar.....	222,636,000 "	230,982,000 "
Cotton.....	1,079,799,600 "	2,154,820,800 "
Wool.....	31,277,839 "	60,264,913 "
Hay.....	9,297,743 tons.	19,083,896 tons.
Butter.....	239,601,405 pounds.	459,681,372 pounds.
Hemp.....	69,470 tons.	74,493 tons.
Hogs.....	22,225,766 "	33,512,867 "
Bituminous Coal.....	3,247,264,425 bushels.	3,621,923,165 bush'ls.
Horses and Asses.....	4,804,634 "	7,400,322 "
Cattle.....	12,517,392 "	25,616,019 "
Sheep.....	11,973,315 "	22,471,275 "

Showing for the river States a great preponderance in the products of the whole country.

The total tonnage owned in the United States is returned in the census of 1860 as 5,353,868 tons, and the portion belonging to the fourteen States as 996,266 tons, but it is estimated, by competent parties, that the steamers on the Ohio and Mississippi have carried 7,905,216 tons during the year 1866; evincing the activity in domestic commerce of these river States, and this commerce but yet in its infancy—for it is developing daily, and demonstrating that from these States has and must come the food supply for the whole nation and for export; and that they must also supply the gold and silver States, which are developing so largely and quickly upon the tributaries of their rivers.

This domestic commerce suffers greatly from the rapids in the Mississippi and Ohio rivers, and from the accretions at the mouth of the Mississippi; and, impelled by the necessities of the case, that action must be had to remedy these grievances, 413 delegates, representing the States of Minnesota, Wisconsin, Iowa, Illinois, Missouri, Indiana, Ohio, Pennsylvania, Kentucky, Arkansas, Tennessee and Louisiana, appointed by the Boards of Trade in those States, met in Convention at St. Louis, on the 12th and 13th of February, and, after full discussion, passed, with entire unanimity and harmony, the following resolutions, and instructed your memorialists to present the same to your Honorable Body.

Resolved, That the interests of the whole Mississippi valley require the immediate improvement, by the National Government, of the Mississippi river, from Balize to the Falls of St. Anthony, including especially the bars at the Balize, the upper and lower rapids, and the removal of obstructions above those rapids; and also of the Ohio river from Cairo to Pittsburg, and especially the work at the Falls of the Ohio; said improvements to secure the navigation of said rivers free from all tolls or tribute.

Resolved, That the vast importance of such action as will secure the needed improvements, at any early day, of the following rivers, is commended to the favorable and earnest consideration of Congress, viz.: the Missouri river, from its mouth to Fort Benton; the Illinois river; the Red river; the Tennessee river to Chattanooga; the Wisconsin and Fox rivers; the Arkansas river to Fort Smith; the Cumberland to Nashville.

Resolved, That when the financial condition of the country may justify, Congress be requested to cause proper investigations to be made, as to the necessity of improving, hereafter, all the other navigable rivers of the Mississippi valley.

Resolved, That Congress should legislate on the subject of bridging the Mississippi and other navigable rivers of the United States, as will, while recognizing the equal importance of railroad and river transportation, harmonize both these interests, by securing proper facilities for both.

Your committee recommend, in pursuance of the foregoing objects, the appointment of a committee consisting of one member from each State represented in this Convention, with a sub-committee of five to prepare a memorial to Congress demonstrating the national importance of said objects, and that each member of said General Committee report to said sub-committee such statistics as will facilitate the work. It is further recommended, that the resolutions adopted, and the memorial, be forwarded to Congress in the name of this Convention, by its President, and that copies thereof be furnished to each Senator and Representative from the States of the Mississippi valley.

In performing this duty your memorialists cannot but call your attention to the evidence in the resolutions, that the river States are not asking for any local legislation; they have put away all such, or any legislation that is not needed for the national interest, and is not called for by a sufficient population and commerce, until a similar claim can be established; nor have they asked for anything that could be done by one State, or by companies or individuals; for the rivers, for which appropriations are asked, are boundaries of States and national highways, over which no one State has competent jurisdiction; and the evidence in the late war must be conclusive, that these rivers were the main arteries of the nation, and were essentially national; as, from them came such stores of food and forage, such navies for transportation, such gun-boats and bodies of men as contributed essentially to removing the paralyzing obstructions to the power and sovereignty of the whole United States.

Your memorialists would urge that the domestic commerce of this country is of right entitled to the fullest consideration of its legislators. We do not object to the care of its sea and lake shores, evinced in the appropriations for coast survey, light-houses, break-

waters, blasting and dredging; but, as we have shown, the domestic commerce exceeds four times the foreign, and while the foreign returns to the country articles of luxury with a few necessities, the domestic commerce comprises every necessity of life to the nation.

The rivers, as well as the ocean and lakes, are of right a great consideration in legislation, as developing upon their waters the domestic commerce of the country—so essential to the country's welfare, both in peace and war; and the people of this great valley should be enabled to navigate these free waters, unimpeded by any natural obstacles which can be removed, and untrameled by the necessity of paying tribute to corporations, which may eventuate from the neglect of government in its internal care.

But the agriculturists of the country claim the consideration of its legislators, and your memorialists have been specially urged by this interest to represent, that their produce pays tribute to these rapids and the obstructions at the mouth of the river, in a large diminution in the net value, to them, of their produce: and while, with proper water facilities, they could supply the world with food, they should not be compelled, by the neglect of the government to keep in order their natural highway—the rivers—to pay to railroads the greater part of their bulky productions for their transportation to market, when it is possible to reduce that proportion at least one-half by water conveyance: resulting, that their labors are not recompensed, their lands cannot be profitably cultivated, and the resources of the nation become seriously limited.

Your memorialists were further instructed to ask of your Honorable Body the speedy appropriations necessary for the removal of the obstacles at the Des Moines and Rock Island Rapids, as shown by the surveys lately made and reported to your body, from Gen. James H. Wilson, of the Engineer department; and also for the completion of the enlargement of the canal at Louisville, as will appear by the reports of the progress of the works before your Honorable Body; and also for the deepening of the mouths of the Mississippi river, reports of which have been, and will be, furnished to your Honorable Body. They would respectfully urge that these improvements progress together as much as possible; the restrictions to commerce being at both the head and foot of these noble rivers; one alone removed would be partial and incomplete in its results.

In behalf of the Convention,

EDWIN O. STANARD,	} <i>Sub-Committee.</i>
GERARD B. ALLEN,	
JOSEPH BROWN,	
JAMES F. GRIFFITH,	
E. W. FOX,	

In behalf of the General Committee,

CHAS. L. TUCKER, *Chairman.*

FIGURES FROM CENSUS OF 1860,

On which Tables in Memorial to Congress is based.

STATES.	Improved Acres.	Unimproved Acres.	Horses.	Asses.	Hogs.	Wheat, bush.	Rye, bush.	Corn, bush.	Oats, bush.	Tobacco, lbs.	400lb bales Cotton.
Arkansas	1,933,313	7,590,393	140,198	57,358	1,171,680	957,601	78,092	17,823,588	475,268	989,980	367,393
Illinois	13,096,374	7,815,615	563,736	38,539	2,602,308	23,837,023	951,281	115,174,777	15,220,029	6,885,262	1,482
Indiana	8,242,183	8,146,109	520,677	28,898	3,099,110	16,848,267	463,495	71,588,919	5,817,831	7,993,378	.....
Iowa	8,792,792	6,277,115	175,088	5,734	934,820	9,449,403	183,022	42,410,686	5,887,645	303,168	.....
Kentucky	7,644,208	11,519,053	355,704	117,634	2,330,505	7,394,809	1,055,260	64,043,633	4,617,029	108,126,840	.....
Louisiana	2,707,108	6,591,468	78,708	91,762	634,525	82,208	36,065	16,853,745	89,377	39,940	777,738
Minnesota	556,250	2,155,718	17,065	377	101,371	2,186,993	121,411	2,941,952	2,176,002	38,938	.....
Mississippi	5,065,755	10,773,929	117,571	110,723	1,532,768	587,925	39,474	29,057,682	221,235	159,141	1,202,507
Missouri	6,246,871	13,787,939	361,874	80,941	2,354,425	4,227,586	293,262	72,892,157	3,680,870	25,086,196	41,188
Ohio	12,625,394	7,846,747	625,346	7,194	2,251,653	15,119,047	683,686	73,543,190	15,409,234	25,092,581	.....
Pennsylvania	10,463,296	6,548,844	437,654	8,832	1,031,266	13,042,165	5,474,788	28,196,821	27,387,147	3,181,586	.....
Tennessee	6,795,637	13,873,828	290,882	126,345	2,347,321	6,459,268	257,989	52,089,926	2,267,814	43,448,097	296,464
Virginia	11,437,821	19,679,215	287,579	41,015	1,599,919	13,130,977	944,330	38,319,999	10,186,720	123,968,312	12,727
Wisconsin	3,746,167	4,147,420	116,180	1,030	334,055	15,657,458	888,544	7,517,300	11,059,250	87,340	.....
	94,402,869	126,703,393	4,088,257	716,377	22,225,766	126,930,730	11,470,695	632,454,375	103,995,461	345,400,759	2,699,499
Kansas	405,468	1,372,932	20,344	1,496	138,224	194,173	3,833	6,150,727	88,325	20,349	61
Dakota	2,115	24,333	84	19	287	945	7,700	20,269	2,540	10	.....
Nebraska	118,789	512,425	4,449	459	25,369	147,867	2,495	1,482,080	74,502	3,636	.....
Total U. S.	163,110,720	244,101,818	6,249,174	1,151,148	33,512,867	173,104,924	21,101,380	888,792,740	172,643,185	484,209,461	5,387,052

FIGURES FROM CENSUS OF 1860 (*continued*).

STATES.	Tons Bituminous Coal.	True Value Real and Per- sonal.	Tonnage cleared.	Tonnage owned.	STATES AND TERRITORIES.	Hhds. (1,000 lbs.) Sugar.	Population.	Square Miles.
Arkansas .....	.....	219,256,473	.....	.....	Arkansas .....	.....	435,450	52,198
Illinois	14,258,120	871,860,282	67,952	100,698	Illinois .....	.....	1,711,951	55,405
Indiana	379,035	528,835,371	.....	.....	Indiana .....	.....	1,350,428	33,809
Iowa	72,500	247,338,265	.....	.....	Iowa .....	.....	674,913	55,045
Kentucky	6,782,000	666,043,112	.....	36,802	Kentucky .....	.....	1,155,684	37,680
Louisiana .....	.....	602,118,568	894,353	234,989	Louisiana	221,726	708,002	46,481
Minnesota .....	.....	52,234,413	.....	869	Minnesota .....	.....	172,123	88,531
Mississippi .....	.....	607,324,911	.....	3,787	Mississippi	506	791,305	47,156
Missouri	97,000	501,214,398	.....	64,684	Missouri	402	1,182,012	67,880
Ohio	28,339,900	1,193,898,422	51,917	115,530	Ohio .....	.....	2,339,511	39,964
Pennsylvania	66,994,295	1,416,501,818	142,348	308,766	Pennsylvania .....	.....	2,906,115	46,000
Tennessee	8,474,100	483,903,892	.....	12,364	Tennessee	2	1,109,801	45,600
Virginia	9,543,627	733,249,681	80,381	92,812	Virginia .....	.....	1,596,318	61,952
Wisconsin .....	.....	273,671,668	51,503	25,020	Wisconsin .....	.....	775,881	53,324
	129,890,577	8,467,511,274	1,288,454	996,266		222,636	16,909,494	725,525
	25							
	649,452,885				Kansas .....	.....	107,206	78,418
	259,781,154				Dakotah .....	.....	4,837	318,128
					Nebraska .....	.....	28,841	122,007
					Colorado .....	.....	34,277	105,818
					Nevada .....	.....	6,857	63,473
	3,247,264,425				Utah .....	.....	40,273	128,835
	[bush.				New Mexico .....	.....	93,516	243,063
Total U. S.	Tons 144,876,927 3,621,923,175	16,077,358,715	8,789,929	5,353,898	Total U. S.	230,982	31,000,000	1,785,267 3,001,002

STATES AND TERRITORIES.	Cows.	Working Oxen.	Other Cattle.	Sheep.	Wool, lbs.	Irish Potatoes, bush.	Sweet Potatoes, bush.	Butter, lbs.	Hay, tons.	Hemp, tons.
Arkansas.....	171,003	78,707	318,089	202,753	410,382	418,010	1,566,540	4,067,556	9,356	447
Illinois.....	522,634	90,380	970,799	769,135	1,989,567	5,540,390	306,154	28,052,551	1,774,554	1,502
Indiana.....	363,553	117,087	588,144	991,175	2,552,318	3,866,647	299,516	18,306,651	622,426	4,222
Iowa.....	189,802	56,964	298,322	259,041	660,858	2,806,720	51,362	11,053,666	813,173	651
Kentucky.....	259,215	108,999	457,845	938,990	2,329,105	1,756,531	1,057,557	11,716,609	158,476	39,409
Louisiana.....	129,662	60,358	326,787	181,263	290,847	294,655	2,060,981	1,444,742	52,721	1
Minnesota.....	40,344	27,568	51,345	13,044	20,388	2,565,485	792	2,957,673	179,482	109
Mississippi.....	207,646	105,603	416,660	352,632	665,959	414,320	4,563,873	5,006,610	32,901	.....
Missouri.....	345,243	166,588	657,153	937,445	2,069,778	1,990,850	335,102	12,704,887	401,070	19,267
Ohio.....	676,585	63,078	895,077	3,546,767	10,608,927	8,695,101	304,445	48,543,162	1,564,502	1,202
Pennsylvania.....	673,547	60,371	685,575	1,631,540	4,752,522	11,687,467	103,187	58,653,511	2,245,413	46
Tennessee.....	249,514	102,158	413,060	773,317	1,405,236	1,182,005	2,604,672	10,017,787	143,499	2,243
Virginia.....	330,713	97,872	615,882	1,043,269	2,510,019	2,292,398	1,960,817	13,464,722	445,183	15
Wisconsin.....	203,001	93,652	225,207	332,954	1,011,933	3,818,309	2,396	13,611,328	855,037	356
	4,372,462	1,229,985	6,914,945	11,973,315	31,277,839	47,323,888	15,217,394	239,601,405	9,297,743	69,470
Kansas.....	28,550	21,551	43,354	17,569	24,746	296,335	9,965	1,093,497	56,232	44
Dakota.....	286	348	167	193	.....	9,489	.....	2,170	.....	.....
Nebraska.....	6,995	12,594	17,608	2,355	3,302	162,188	168	342,541	12,842	9
Total U. S.	8,581,735	2,254,911	14,779,373	22,471,275	60,264,913	111,148,867	42,095,026	459,681,372	19,088,896	74,493

ADDENDA.

39TH CONGRESS, }
2d Session. }

HOUSE OF REPRESENTATIVES.

{ Ex. Doc.
{ No. 79.

SURVEY OF MISSISSIPPI RIVER.

LETTER

FROM

THE SECRETARY OF WAR,

IN ANSWER TO

A Resolution of the House of 25th of January last, transmitting a Report by the Chief of Engineers of the Survey and Improvement of the rapids of the Mississippi river, called for by a resolution of the House of Representatives of January 25.

FEB. 6, 1867.—Referred to the Committee on Commerce and ordered to be printed.

WAR DEPARTMENT,
Washington City, February 6, 1867.

SIR: I have the honor to transmit herewith a report by the Chief of Engineers, of February 5, covering General Wilson's report in reference to the survey and improvement of the rapids of the Mississippi river, called for by a resolution of the House of Representatives of January 25.

Very respectfully, sir, your obedient servant,

EDWIN M. STANTON,
Secretary of War.

Hon. SCHUYLER COLFAX,
Speaker of the House of Representatives.

ENGINEER DEPARTMENT,
Washington, February 5, 1867.

SIR: In obedience to the act approved June 23, 1866, "making appropriations for the repair, preservation, and completion of certain public works," &c., and in compliance with the resolution of the United States House of Representatives of the 25th ultimo, I transmit herewith the report of Brevet Major General J. H. Wilson, United States Army, captain of engineers, now lieutenant colonel thirty-fifth infantry, on the improvement of the Des Moines and Rock Island rapids of the Mississippi river.

General Wilson was assigned August 3, 1866, by order of the Secretary of War, to superintend the improvement of the Des Moines and Rock Island rapids of the Mississippi river, and the survey of the Rock and Illinois rivers. He was directed to proceed to his post at Keokuk, Iowa, by way of this city. While here he received verbal and

written instructions from this bureau, and authority to employ as many civil engineer assistants as might be necessary, in order to push the surveys and examinations with which he was charged rapidly to completion. Brevet Lieutenant Colonel P. C. Hains, captain of engineers, was detailed as his assistant.

As a necessary preliminary to the improvement of the Des Moines and Rock Island rapids of the Mississippi river, he was directed to make such resurveys as might be required, in order to decide upon the merits and adaptability of the various plans which seemed to demand attention, and particularly the one of excavating the channel, which had been previously followed by the department. A careful resurvey was made of both rapids, much additional and interesting information was collected, and embodied in the reports, maps, sections, and profiles herewith submitted. It was found that the two rapids are very different in their physical characteristics.

THE DES MOINES OR LOWER RAPIDS.

The Des Moines rapids are eleven miles long, and for eight miles of their length, beginning at the lower end, are smooth, unbroken, and gradual in their descent. The river on the rapids averages four thousand five hundred feet wide, but nowhere presents either "pools," properly so called, or any well-defined or navigable channel at low water. The navigation is therefore bad during the entire boating season, and almost entirely suspended for one-third of the time. "The difficulty of navigation, it may be observed, on all the chains, lies not so much in the shallowness of the channel or thread of the current as in its unevenness of bottom, insufficient width, tortuous direction, and great velocity. The influence of these features is exaggerated by cross-surface and under-currents, and by cross-winds (east and west)."

The plan of excavating the channel is for a variety of reasons exceedingly difficult to execute at the lower rapids, and would not, on account of winds, cross-currents, and dangers of navigation by night, accomplish all that is demanded by commerce. In order to enlarge the channel to two hundred feet width and four feet depth at extreme low water, it will be necessary, according to the report of Lieutenant Warren of 1854, making allowance for ten inches additional depth not provided for by him, and rendered necessary by the low water of 1864, to excavate about 150,000 cubic yards of stone. According to the data recently obtained it will require the excavation of 177,520 cubic yards, which, at an average of fifteen dollars per yard, will cost \$2,662,800.

Several other plans, such as the construction of a continuous dam with locks across the entire stream, and various modifications of wing-dams, sluices, and chutes for narrowing and deepening the thread of the current, have been suggested and carefully considered, but all have been rejected by General Wilson as involving too many elements of uncertainty to warrant their application to a river of such magnitude as the Mississippi. They are more or less experimental in their character, there being elements in the problems indeterminate in their value and influence. While some of the plans might materially ameliorate the present difficulties, the uncertainty of their success and of their probable cost prevent their adoption.

From these considerations General Wilson recommends the construction of a canal along the Iowa shore, from the city of Keokuk to a point just below the village of Nashville; the remainder of the distance to be overcome by using the natural channel, which from that point to the Upper Chain is found to contain sufficient water for all purposes. At the Upper Chain a through cut, 200 feet wide, 6 feet deep, and 2,421 feet long, will be necessary, requiring 55,000 cubic yards of rock to be excavated.

The estimated dimensions of the canal are as follows: Length, 7.6 miles; width on the water surface, 300 feet; and depth at the lowest stage, 6 feet. It should run the entire distance, except at one or two points along the shore, in the bed of the river. The river embankment, for strength and economy, should be constructed of earth, and securely covered inside and out with a well made rip-rap of broken stone. It will require two lift locks and one guard lock; the left lock to be 300 feet between the mitre-sills, 80 feet wide in the chamber, 78 feet wide at the water surface, and lift, respectively, 8 and 10½ feet at low water. The estimate cost of the proposed canal and cut at Montrose island is \$3,890,000. This may be reduced to \$2,731,773 by arranging the

canal so that it shall have only five feet depth at low water, and still further by the sum of \$34,155 should it be found ultimately unnecessary to construct the stone pier at the foot of Montrose island. The estimated amount that can be profitably expended during the fiscal year ending June 30, 1867, is \$1,000,000, including the \$200,000 already appropriated. The estimated amount that can be profitably expended during the fiscal year ending June 30, 1868, is \$1,000,000. Carefully prepared estimates of cost and general plans of the proposed canal, with a map of the rapids, are submitted herewith.

Detailed maps, plans, and specifications will be forwarded as soon as the other important duties with which General Wilson is charged will permit.

THE ROCK ISLAND RAPIDS.

The Rock Island rapids are fourteen miles in extent, with a descent of 21.5 feet. The river is 2,500 feet wide, and has a cross-section varying from 6,830 square feet to 30,230 square feet.

The channel, unlike that of the Des Moines rapids, is sufficiently deep nearly everywhere, having eleven miles of good navigation, with wide and deep "pools" in many places. It only requires to be straightened and widened, and occasionally deepened, in order to secure good navigation. In view of these facts, and that the work of excavation can be done at a much less cost than a canal can be built for, it is recommended that a plan of excavating the channel by means of coffer-dams, subaqueous blasting, and chiselling be adopted. It is estimated that it will be necessary to remove 57,451 cubic yards of stone, and that it will cost \$813,600. No detailed estimate has been made for a canal, but it is known that a work of this kind, sufficiently large to accommodate the commerce of the river, would cost from \$2,500,000 to \$3,500,000; and as there are no insuperable difficulties at these rapids to the execution of the plan proposed by General Wilson, it is recommended for adoption.

Copies of the map and profile of the proposed canal and locks for the improvement of the Des Moines rapids of the Mississippi river, &c., of plan of proposed improvement of the channel at Montrose island, &c., and diagram showing the direction of the current at the railroad bridge, Davenport, Iowa, are herewith transmitted. The other maps accompanying the report of General Wilson will be forwarded as soon as they can be copied.

Very respectfully, your obedient servant,

A. A. HUMPHREYS,

Chief of Engineers.

Hon. E. M. STANTON, *Secretary of War.*

UNITED STATES ENGINEER'S OFFICE,
DES MOINES AND ROCK ISLAND RAPIDS IMPROVEMENT,
AND ILLINOIS AND ROCK RIVER SURVEYS,
Davenport, Iowa, January 1, 1867.

GENERAL: I have the honor to submit the following report and recommendations in regard to "the improvement of the Des Moines and Rock Island rapids of the Mississippi river."

Having been assigned by order of the War Department to the superintendence of these works, August 3, 1866, I proceeded to Washington city as soon as possible after the completion of the duties upon which I was then engaged in connection with the defences of Delaware bay and river.

While at Washington making arrangements to secure copies of such maps and reports concerning the improvement to which I had been assigned as might be on file in the Engineer Bureau, I received the following instructions:

ENGINEER DEPARTMENT,

Washington, August 14, 1866.

GENERAL: In obedience to Special Orders No. 379, Adjutant General's Office, August 3, 1866, you will proceed to Keokuk, Iowa, to superintend the improvement of the Des Moines and Rock Island rapids of the Mississippi river and the survey of the Rock river in the States of Illinois and Wisconsin, with its connection with Lake Winnebago.

In addition to the above duties, you are hereby assigned to the survey of the Illinois river from its mouth to La Salle.

You will accordingly make all the necessary arrangements for the prosecution of the above duties, which it is very desirable should be commenced at the earliest practicable period, that the bureau may place before Congress at its next session the result of your examinations and plans of improvement.

You are authorized to employ as many civil assistants as you may require, at such compensation as will command suitable qualifications, to be subject to the approval of the department, with the mileage allowed to officers while travelling on duty.

Very respectfully, your obedient servant,

A. A. HUMPHREYS,

Chief of Engineers, Brig. and Brevet Maj. Gen. U. S. Army.

Brevet Major General J. H. Wilson,

United States Army, Corps of Engineers, Washington, D. C.

ENGINEER DEPARTMENT,

Washington, August 15, 1866.

GENERAL: The amounts appropriated for the improvement of the Des Moines and Rock Island rapids in the Mississippi river, by act of Congress approved June 23, 1866, for repairs, &c., of certain public works, are in accordance with the report of the bureau of engineers of the 1st of March, 1866, (a copy of which has been sent to you,) founded upon the estimates of the board of engineers of August 26, 1854.

The efforts of the department have been heretofore directed to the removal of the obstructions in the rapids, with a view of securing a continued low-water channel of two hundred feet width and four feet depth throughout. Your attention is now directed particularly to this subject, and in resuming operations at these localities, a careful examination or survey of those portions that have been improved should be made, to ascertain if any modification of the plan shall be deemed necessary and proper.

The main object is to promote the interests of commerce by additional facilities to overcome the existing difficulties upon the rapids, under the conditions of the above act, until a plan shall have been adopted to secure a safe and convenient navigation to the naval and commercial vessels of the United States. The latter subject is also placed with you for investigation, and an early report is desired from you, with a plan, accompanied by the necessary drawings and estimates of cost, matured after complete examination and survey of the localities.

The surveys of Rock and Illinois rivers will also require your attention, and your report and plan of improvements, accompanied by estimates, should be submitted as soon as it is possible to obtain the necessary data therefor.

Your operations will be strictly conformable with the provisions of the act referred to, respecting contracts, and the information to be incorporated in your report.

Copies of such reports and drawings of the works as you may need, and now on the records of the bureau, will be furnished.

Very respectfully, your obedient servant,

A. A. HUMPHREYS,

Chief of Engineers, Brig. and Brevet Maj. Gen. U. S. A.

Brevet Major General J. H. WILSON,

United States Army, Washington, D. C.

In addition to the foregoing instructions, I conferred freely with the chief engineer and his assistant, Brevet Colonel J. C. Woodruff, in regard to the scope of the duties to which I was assigned, and, in accordance with their views, made my arrangements for a thorough examination of both rapids, and for the exhaustive consideration of all the plans of improvement which had been suggested, or which might present themselves during the survey.

Brevet Lieutenant Colonel P. C. Haines, captain of engineers, was directed to report to me to assist in the investigation; and the sum of \$28,500 out of the general appropriation for the "survey and examination of western and northwestern rivers" was placed to my credit, for the purpose of defraying the expense of the various surveys under my charge. It was estimated that \$10,000 would be required for the survey of the rapids.

Having proceeded to Keokuk, Iowa, and organized the field parties for the survey of the Rock and Illinois rivers, I directed Colonel Haines to take post at Davenport, and assume personal charge of the Rock Island rapids survey. He was instructed "to examine and survey accurately the places on the rapids where boats experience difficulty and encounter danger from shoal water, swift currents, and tortuous channels, so that an accurate estimate may be made of the amount of excavation necessary to render navigation safe and expeditious; to locate correctly the Rock Island railroad bridge on his map, ascertain the direction of the currents through its bays, state its general influence upon the free navigation of the stream by all kinds of craft, to obtain all the data within reach in regard to the cost of rock excavation under water by the various practicable means, to note the condition and influence of the dams at Moline, and ascertain whether or not they might be continued for mill purposes without injury to the navigation of the open river."

He was also directed to carefully survey the river valley on both sides, with accurate instruments, theodolite, level and chain, along the rapids for five or six miles above and below, so as to show on his maps both longitudinal and cross sections of shores and water; to make careful observations of the velocity of the currents at various points on the rapids, as well as above and below them; and, in short, to obtain every kind of information likely to throw light upon the various plans of improvement which might be presented for discussion. In order to complete the work assigned him at the earliest possible day, Colonel Haines was authorized to employ as many civil engineer assistants as might be necessary.

The report of Colonel Haines, and that of the board of engineers convened at his request, are submitted herewith as a part of my own report.

The survey for additional information at the Des Moines rapids was intrusted to H. A. Ulfers, civil engineer, brevet lieutenant colonel volunteers, assisted by Ernst F. Hoffman, civil engineer, late major and additional aide-de-camp United States army, under similar instructions to those given to Colonel Haines. The instruments furnished by the engineer department, and used in these surveys, were of the best quality, and every precaution was taken to secure extreme accuracy.

Upon an examination of the surveys made by Lee and Warren, it was thought necessary to make entirely new surveys, not only to verify the maps projected from the old data, but to extend the information sufficiently to allow a thorough discussion of the entire subject. Lee's map, made in 1837, was found to be of no use except to give a general idea of the topography and hydrography of the localities; while Warren's, although sufficiently accurate, had been made to illustrate simply the projects of excavating a channel in the bed of the river.

Before proceeding to the discussion of the various plans of improvement which I have thought entitled to consideration, I desire to state, that, as it required the entire fall, till the beginning of the severe weather of winter, to finish the field-work of the surveys, it has been found impracticable to submit with this report minute and detailed maps and specifications of the plans of improvement herein recommended, but they will be prepared as soon as the necessary time can be devoted to that purpose. The general plans, with maps to illustrate them, as well as the estimates of cost, have been made with great care, and sufficiently in detail to give a correct idea of the localities and the works adapted to them, as well as what it will cost to carry them into execution speedily and economically.

THE DES MOINES RAPIDS.

The Des Moines or lower rapids are situated near the mouth of the Des Moines river, and extend from Keokuk to Montrose, a distance of about eleven miles. During the low-water season they interpose a serious and at times an absolutely impassable barrier to steamboat navigation. The Upper Mississippi, from St. Paul to the mouth of the Missouri, has, during the lapse of the more recent geological periods, worn for itself a valley varying from one to fifteen miles in width, and sunk below the general level of the prairies on either side from one hundred and fifty to three hundred feet. In many places, and for much of the distance, this valley is cut through strata of rock varying in thickness, hardness and mineral characteristics. Without discussing the agencies by which this erosion, so disproportionate to the present powers of the river, has been effected, the Des Moines rapids present evidences strongly confirmatory of changes in the character of the river itself. General Humphreys, in his report upon the hydraulics of the Mississippi river, suggests that it was formerly a clear-water river like the

Niagara, fed by a fresh-water lake or lakes of great extent, occupying a large portion of what is now the prairie land of Illinois and Iowa, and that its transformation "from a clear into a muddy stream may have been the result of changes which have taken place in the basin." In support of this theory he refers to the passage of the river through the northeastern extremity of the Ozark mountains, at Grand Tower, below St. Louis, where the water has cut down through beds of rock upwards of three hundred feet thick, and probably drained the lake just mentioned. Another instance, developed by the survey and examination of my assistant, Colonel Ulffers, amounting almost to a proof, can be found at the head of the Des Moines rapids. Just below Montrose the rocky bluffs recede at right angles from the river, bearing gradually to the northward, and enclosing a considerable extent of country above and to the westward, which was once, evidently, the bed of an extensive lake, whose outlet was at the rapids, and whose surface was about one hundred and five feet above the present low-water level. This lake basin is an extensive level plain, intersected by a network of sloughs, its lower part subject to annual overflows, and covered with a heavy growth of willow, maple, hickory, haw and vines. The terraces around it are well developed, and of an unvarying height; its upper end, and, in part, its western side, are limited by beds of loam, rising one hundred and fifty feet above low-water at Fort Madison, and forming the entire river bluff at this place. How far this loam deposit extends above and into the interior of Iowa has not yet been determined, and therefore what may have been the extent of the lake itself in these directions cannot be asserted.

As before stated, the outlet of this lake was at the present head of the lower rapids. The waters stored up there have, by their ceaseless action for ages, assisted by ice and other geological agencies, gradually eroded for themselves a channel at least a mile wide, nearly two hundred feet below the general level of the prairies, and extending through limestone rock to the mouth of the Des Moines river and beyond. This erosive action, though productive of such remarkable results, has not yet been carried sufficiently far to render the river through this part of its bed available and safe at all times for the purpose of navigation. From Fort Madison to Montrose the river is about 2,500 feet wide, and sufficiently deep; but on the rapids its bed of limestone rock, which, by some unknown cause, seems to have been hardened to a greater degree than the corresponding stratum above and below the rapids, has resisted the action of the water, while its sides have given way. The result is, that this mass of rock remains there, acting exactly as an artificial dam, whose upper surface slopes about twenty-two feet in eleven miles, and conforms very nearly to the plane of stratification of the rocks through which the channel is cut. The bluffs extend along the banks of the river throughout the length of the rapids, presenting a rock escarpment at the present high-water mark, with a sloping gravel beach to low water, and also another escarpment of rocks at 105 feet above the present water level, having likewise a sloping beach at its foot. The exposed ledges are formed of different strata in the different localities. At some places they are brecciated limestone, (near Montrose;) in others, magnesian limestone, (above Larey's creek,) and, in others, the coal-measure sandstone, (below Price's creek;) but, notwithstanding the varying hardness of these strata, they have all been cut through equally by the river in its progress from the upper beach just mentioned down to the one at the present low-water level on the rapids. About sixty feet of these bluffs, however, consist of the geode bed, lying between the two beaches, and made up mostly of an accumulation of clay and marl easily washed away. The river, forcing its way through these beds of stubborn materials, must, therefore, have gradually receded from the foot of the rapids, like the Niagara is doing now, until it reached its present condition. Undoubtedly the process of smoothing its path is still going on, although in an imperceptible degree. In places where the bluffs recede from the bank, at the mouth of creeks emptying into the river, there are two "terraces" beside the present river bottom, respectively twenty-five and seventy feet above present low water. The level part of the town of Nauvoo, at the head of the rapids opposite Montrose, is built upon the twenty-five foot terrace, which is likewise prominent around the edge of the plain between the latter place and Fort Madison. The seventy foot terrace is most prominently developed near Sandusky. The total length of the Des Moines rapids, measured along the Iowa shore from Montrose (old Fort Des Moines) to the St. Louis Packet Company's landing, at Keokuk, (station D to station V,) is 10.92 miles; on the Illinois side, from Nauvoo, the Hamilton Ferry landing (station 23 to station 84) is 12.20 miles, or a mean of 11.56 miles.

The total fall in this distance on the Iowa side is 22.046 feet; on the Illinois side, 21.933 feet, or a mean of 21.989 feet—sensibly, 22 feet. The difference of the two lines of levels, being only .113 of an inch, may be regarded as inappreciable. The mean width of the river is about 4,500 feet on the rapids, or almost 2,000 feet wider than it is above and below; its mean depth, calculated from upwards of two thousand low-water soundings, reduced to the low-water of 1864, is 2.4 feet, though there are large areas where the depth is much less; its average area of cross-sections is 17,550 square feet at ordinary low-water; its mean surface velocity is 2.88 feet per second, and its mean velocity deduced therefrom is 2.304 feet per second. From these data the discharge has been calculated, and is found to be 40,435 cubic feet per second. This discharge was calculated with a mean depth of 3.9 feet, the average depth at the time the velocities were observed. For extreme low-water 1.5 foot must be subtracted from the average depth, which will give 24,883 cubic feet per second.

The bed of these rapids, throughout its entire length, has reached a stratum of "cherty limestone" belonging to the Keokuk group of the carboniferous series. The nature of this rock, consisting as it does of thin beds of limestone, interstratified with at least an equal amount of brittle chert or hornstone, precludes the idea that the different "reefs" or "heads of chains" might be occasioned, as formerly supposed, by a succession of strata, which in their out-crop would form a barrier across the river. The deeper parts of the rapids are all caused by erosion originating partly from the strength of the current, aided by the presence of numerous granite boulders, and partly by masses of ice which are annually swept down by the spring freshets with tremendous force.

In the various soundings carried across the river, no trace was found of "pools" or places where the area of the cross-section would be sensibly greater than on the "heads of the chains." In other words, there is no proper chain crossing the river at any place, nor is there anything like a true "pool," the deep water being found more properly in fissures and pockets.

The river bottom is a broad, smooth rock, seamed by a narrow, crooked channel, or in some places several of them, alternately widening and narrowing, shoaling and deepening; nowhere good navigation, but more difficult in some places than in others. The rapids are therefore not broken and noisy, but the descent being gradual, the water flows over its bed in a broad, smooth, unbroken sheet, with nothing but the faintest ripples on its surface to indicate the dangerous places. The casual observer would not suspect the presence of the rapids unless he were notified of their locality beforehand.

From these facts it may be readily inferred that boats would not undertake their passage at night, even if the channel were deep and well defined.

The worst parts of these rapids are called by steamboat and river men "chains," of which there are five principal ones, known as Lower, English, Lamallee's, Spanish, and Upper, respectively. From the Lower to Spanish "chain" inclusive, the channel used by steamboats is crooked, shallow, and exceedingly difficult of navigation, requiring, as General Warren states in his report of April 6, 1854, to be excavated "almost continuously to the landing at Nashville, a distance of seven and a half miles." For this distance the fall is about 18 feet, and the average slope 2.4 feet per mile.

From Nashville to the Upper "chain" the channel is straight and deep, and the fall only four feet, or not more than a foot per mile.

The Lower "chain" extends from Keokuk to the mouth of Price's creek. The channel is 3.5 to 8 feet deep, but it is very swift and crooked, and therefore intersected by surface and under currents, particularly in that part of it known as "Sucker chute" and "Omega patch." The greater part of the last appropriation was expended here, improving the channel materially, but the fragments of the rock blown out were piled alongside of the channel, injudiciously it appears, as the ice has already carried away the greater part of the piles, and redeposited the fragments of rock in the channel.

The English "chain" extends from Montebello to Waggoner's warehouse. The channel running near the Illinois shore in this reach is comparatively straight, from 4 to 7 feet deep, and from 50 to 200 feet wide, and presents no particular difficulties to navigation except in times of high wind.

The head of Lamallee's "chain" is opposite the mouth of Larey's creek. The channel is from 4.5 feet to 10 feet deep, and an average of 120 feet wide, but it is crooked, intricate, and dangerous, owing to the presence of many shoal patches of rocks, the breaks of which are not distinguishable in rough weather.

Spanish "chain" extends from Judge Ballinger's place to within a half-mile of Nash-

ville. The channel is from 3 feet to 13 feet deep, and from 25 feet to 300 feet wide, and although sufficiently difficult of navigation, has been somewhat improved by excavation.

The Upper "chain" extends but a short distance below Montrose island, and is made by a broad, flat bed of rock extending entirely across the river, upon which the water in the dry season is not over 2 feet deep, and frequently not a foot deep. The "channel" is a channel only in name, being nothing more than a slight depression in the rock, about 3 feet deep, and 50 feet wide in the narrowest place. An accurate idea of the geological and other physical features of the entire rapids may be obtained by an inspection of the maps, sections, and profiles submitted herewith.

The difficulty of navigation, it may be observed, on all the "chains," lies not so much in the shallowness of the channel or thread of the current as in its unevenness of bottom, insufficient width, tortuous direction, and great velocity. The influence of these features is exaggerated by cross surface and under currents, and by east and west winds. From fear of the rocks boats are compelled to move slowly, and are therefore more difficult to guide, and no matter how skillful the pilot may be, his boat will be carried forward in the direction of the original impulse for some distance before it can be made to obey the helm. This is particularly the case in windy weather, and whilst going down stream. From these causes, I am of the opinion that, had a careful record been kept of boats grounded on the rapids, it would probably show that as many had struck upon the rocks near the "pools" as on the "chains" themselves. If this view of the case is correct, no amount of excavation would entirely remedy the difficulty.

The greatest fall on the rapids is on the lower "chain," where it amounts to 1.472 foot in 1,000 feet, or 7.77 feet per mile. The velocity of the current is consequently greater here than at any other place, though it was not accurately measured, on account of running ice. The greatest observed velocity was at the head of English "chain," where it was found to be 4.35 feet per second, or 3.02 miles per hour.

The maximum range of the water surface at the head of the rapids could not be determined with exactness for the lack of a well-defined high-water mark, but, from the best that could be obtained, it is found to be about 12.65 feet. General Warren, in his report of April 6, 1854, gives it at 11.75 feet. The average range will probably not exceed 9 feet. At Waggoner's and Nashville, and Keokuk, the difference between extreme high and low water was accurately determined, and found to be 15.88 feet and 19.28 feet respectively.

In 1865 and 1866 navigation opened about the first of March and closed about the first of December, giving 275 days, which may be considered somewhat above the average for the boating season. By an examination of the register kept at the Keokuk indicator by the Upper Mississippi pilots' association, it appears that the water on the lower "chain" was less than four (4) feet for fifty days during 1865, the least depth, 2.3 feet, having been reached on the 20th of June; but this was quite an unusual season, the lowest water generally occurring about the middle of September, and continuing much longer. During 1866 the same register shows ninety-two days, or one-third the entire season, when the water was less than four feet. The least available depth recorded was two feet, and occurred on the 4th or 5th of October. From the 28th of September to the 2d of December the water ranged between two feet and 3.3 feet on the lower "chain." This was about an average year. The driest season known was that of 1864, when the river, early in September, reached a stage about ten inches lower than that just mentioned. The plane of this low water has been taken as the plane of reference for all the soundings made by the parties under my direction.

During the extreme low-water season navigation for steamboats along the rapids is entirely suspended, and their cargoes are transferred either by rail or lighters, at an extra cost of about one dollar per ton, and an average cost of about five hundred dollars per day to the steamboats themselves while discharging and taking on freight, or about one thousand dollars per trip. By a register kept at the Rock Island bridge it is ascertained that during the period of seven years, ending on the 1st day of December, 1866, 2,412 steamboats and 1,363 barges have passed up and down the river; this would be an average of 344 steamboats and 195 barges each way; but the last year shows a large increase in the number of boats of all classes, 677 steamboats having passed up, and 671 having gone down. As many as 600 of these boats probably carried their cargoes to the lower rapids, and, as we have just seen, these rapids had less than four feet of water upon them for ninety-two days, and were almost entirely impassable for sixty-four days, it is safe to calculate that the steamboats alone engaged in this commerce were taxed to

the amount of \$250,000 for extra labor in order to tranship their freight at the lower rapids,* whilst the owners of the freight were compelled to pay one dollar per ton in addition for lighterage and railroad charges. What might have been the influence of the rapids in deflecting commerce from its natural channel, or in repressing it altogether, must remain for the present a matter of conjecture, though it is not difficult to demonstrate that the products which have gone to the railroads, in order to reach a market, have cost the producers twenty-five per cent. of their value more than would have been a fair rate of freight by good water transportation. From these facts, there can be but little doubt that the Des Moines rapids alone, in their present state, cost the people of the Upper Mississippi Valley, at the least possible calculation, a half million of dollars annually. As they are a barrier to nearly forty thousand miles of internal navigation, the equivalent of double that many miles of internal coast bordering upon the Mississippi and its navigable tributaries, it is not difficult to see that their improvement is a matter of national import, in which all sections of the country are equally interested. Tabulated statements of the amount of commerce and navigation which would be benefited thereby, as well as the amount of revenue collected at the nearest ports, are submitted herewith, under the head of "general remarks."

In carrying out the instructions of the engineer department heretofore recited, I have endeavored to consult the interests of commerce in its broadest extent, but have listened attentively to every suggestion in regard to the plan and necessity of improvement, whether made by persons generally or locally interested; but before discussing the various plans which have claimed my attention, I desire to state that all the experience of the past goes to show that no plan can be made entirely effective which is based upon temporary expedients or depends for its execution upon successive appropriations of small sums by Congress, as has been the custom heretofore. Something like \$400,000, exclusive of the last appropriation, have been already appropriated for both rapids, \$335,000 of which have been expended upon the lower rapids, for which amount not to exceed 25,000 cubic yards of stone have been excavated. As this money was expended when labor was comparatively cheap, it ought to have been sufficient, with a judicious plan of improvement, to do nearly the entire work required. Notwithstanding the work done has benefited the channel, I regard the expenditure as almost thrown away, most of it having been consumed in experiments and preparations. After a feasible plan has been devised, and proper estimates have been made, the necessary money should be appropriated at once, so as to secure the means by which the work may be carried forward vigorously and economically till the improvement is finished.

The plan of excavating the channel is, for a variety of reasons exceedingly difficult to execute at these rapids, either by blasting under water or by the use of coffer-dams. In order to enlarge the channel to two hundred feet wide and four feet depth at extreme low water, it will be necessary, according to General Warren's report, (making allowance for ten inches additional depth not provided for by him,) and rehered necessary by the low water of 1864, to excavate about 150,000 cubic yards of stone. According to the data recently obtained, it will require the excavation of 176,519.82 cubic yards, which, at the average of fifteen dollars per yard, will cost \$2,662,797 30. Should this channel be completed, it will not accomplish all that is required, for in addition to the dangers consequent upon cross-currents, it is only indicated by the faintest ripple marks of the running water, and could not, therefore, be used either during the night, in the fog, or during unfavorable winds, and a special pilot would be required at nearly all times. Hence over half the time of extreme low water the river would still be impassable at the rapids. Other difficulties would also continue to exist. The fall of eighteen feet in seven and a half miles, with an increased current, would have to be overcome at a great expense of cost and time by the ascending boats, and the navigation for descending boats would not be shorn of its dangers. In addition to this, as the water is nowhere deep, and as the excavation has to be carried lower than actually required, the tendency is to draw the water from the shores and above, and proportionally transfer it to the shallow places. From these considerations I do not hesitate to recommend the abandonment of this plan at the lower rapids, and the adoption of

* See the certificate of Mr. Griffith, Secretary of the Northern Line Packet Company, submitted herewith.

another which will secure safe, easy, and economical navigation, at any time of night or day, in all kinds of weather, for every species of craft plying upon the river, either above or below the rapids. Nothing less than this will fully subserve the interests of commerce or national defence; and, therefore, nothing else should be adopted. The fullest and most efficient means to overcome the difficulties must ultimately be the most economical, although they might involve the expenditure of a larger sum of money. But when those means are found but a little more expensive, as shown herein, as well as much more certain to accomplish the desired result, they should be adopted at once, and without further argument.

Several other plans, such as the construction of a continuous dam, with locks, across the entire stream, and various modifications of wing-dams, sluices, and "chutes" for narrowing and deepening the thread of the current, have been suggested and carefully considered, but have all been rejected as involving too many elements of uncertainty to warrant their application to a river of such magnitude as the Mississippi. They are, without exception, more or less experimental in their character, and concerned with elements in the problem quite indeterminate in their value and influence; and while some of them might materially ameliorate the present difficulties, the chances in their favor are too uncertain, and their probable cost too much a matter of speculation, to authorize their adoption.

So far as the necessities of commerce are concerned the river has already been sufficiently experimented upon; effective plans are now required.

In view of these facts I have respectfully to recommend the construction of an independent navigation canal along the Iowa shore, from a point near the present site of the Keokuk indicator, at the city of Keokuk, to a point just below the village of Nashville; the balance of the distance to be overcome by using the natural channel, which from here to the upper "chain" is found to contain sufficient water for all purposes. And the upper "chain" a through-cut two hundred feet wide, six feet deep, and 2,400 feet long, will be necessary. A careful calculation shows that 54,882.29 cubic yards will have to be excavated, and this can most surely and economically be done by the use of coffer-dams at the low-water season.

The estimated dimensions of the canal are as follows: length 7.6 miles, width on the water surface three hundred feet, and depth at the lowest stage six feet. The stage of water here referred to is that of 1864, which was ten inches lower than any other season recorded, and about fifteen inches below that of 1866, which may be taken as an average. The canal would therefore pass boats drawing full six feet, and have a sufficient depth in addition for perfect safety during seasons of average low water. It should run the entire distance, except at one or two low points along the shore, in the bed of the river; the river embankment, for strength and economy, should be constructed of earth, and securely covered inside and out with a well made riprap of broken stone, so as to render it entirely safe against the running ice and freshets. It will require two lift locks and one guard lock; the lift locks to be three hundred and fifty feet between the mitre-sills, eighty feet wide between tops of chamber walls, (seventy-eight feet at the water surface,) and to lift, respectively, eight and ten and one-third feet. The lower locks should also be furnished with a set of guard gates for security against floods, and the guard lock proper at the head of the canal should be so arranged as to admit of being used as a lift lock whenever required, which would be after the water in the river at the head of the canal had raised three (or 4) feet above the extreme low-water mark. This construction will admit of nine feet draught, the utmost likely ever to be required for purpose of navigation, either by vessels of commerce or war, and will allow the canal to be used at all ordinary stages of the river, so that ascending boats may avail themselves of the slack water of the canal to overcome the increased currents of high water in the open river. The saving in the fuel and time would alone pay a handsome revenue upon the entire cost of the improvement.

It will be observed that in this canal a greater depth, at extreme low water, is provided for than is required by the present ruling depth of the river above and below; but as the work is intended to be permanent, it should be constructed so as to meet all possible contingencies of the national defence and river improvement in the future.

It is believed that before the expiration of fifty years the average ruling low-water depth of the Mississippi from St. Louis to St. Paul may be increased to six or seven feet, in which event no changes will be necessary in the proposed canal at the lower rapids. This system of navigation, providing in the fullest manner for the improvement of the rapids, will cost \$3,390,000. Should it be deemed inadmissible or unnecessary by Congress to provide, in the dimensions of the proposed canal for the ultimate development of the river above and below, the cost may be reduced to \$2,731,722 96 by reducing the depth of water in the channel and through-cut to five feet instead of six, so as to give good navigation for boats drawing four feet water. This may be ultimately diminished by the sum of \$34,155, should it be found unnecessary to construct the stone pier or wing-dam estimated for at the foot of Montrose island.

The through-cut along the zchannel at the upper "chain" involves the use of cofferdams, and, although they are quite expensive in their application, it is believed that they are more likely than any other means to result successfully; but as the work is to be done by contract, the contractor should be permitted to use his own discretion in the selection of the plan, under sufficient bond and surety for the expeditious excavation of the new channel to the dimensions specified in this report. Estimates of cost, and a general plan of the proposed canal, prepared under my directions by my assistant, Mr. D. C. Jenne, a civil engineer of sound judgment and enlarged experience in the construction of canals, together with a map of the rapids and a part of the river above and below, are submitted herewith.

Detailed maps, plans, and specifications will be prepared and forwarded to the Engineer department as soon as the more pressing duties with which I am charged will permit.

The following extracts from the report of D. C. Jenne, embodying sound opinions, confirmatory of my judgment, will give all the additional information necessary for a complete understanding of the proposed plan of improvement, viz :

* * * * *

"Your special instructions to me were to make a detailed estimate for a canal 300 feet wide and 6 feet deep at low water, (low water of 1864,) with locks 350 feet by 80 feet, extending from the deep water at Nashville to the deep water at Keokuk. After a personal examination of the route, I was enabled, very carefully, to locate on the map which Colonel Ulffers had prepared, a centre line of canal, which is, generally, about 150 feet from the shore, except for a distance of 1.44 mile, where it runs on the low table-land adjoining the river. A profile of the surface-line of low and high water, and of the ground and the bed of the river, showing both excavation and embankment, has also been prepared. At the head of the canal is located a guard-lock, with walls 21½ feet high, or two feet above high-water mark. This will be used as a lift-lock when the water in the river is more than three feet above low water. It will have a favorable location, independent of the river, and the cost of bailing and draining will be comparatively small.

"A lock of eight feet lift is located at a point about 5.6 miles from the upper end, and two miles from Keokuk. This lock also has a location independent of the river, and not expensive for bailing and draining.

"At the lower end a lock of ten and one-third feet lift is located entirely in the river, and its construction will require an expensive coffer-dam, and make the item of bailing and draining very heavy. Its location is such as to make six feet of water on the mitre-sill at low water. The walls will be twenty-eight and two-thirds feet high, which will carry them two feet above high water. In the centre is placed an extra set of gates, which reverse in closing, to keep high water out of the canal.

"The river bank of the canal for the entire length is to be raised four feet above the high water of 1851, and is to be twenty feet wide on the top, with an outside slope of one and a half to one, and an inside slope of one and a quarter to one, with a heavy riprap wall on the outside and a lighter one on the inside and over the top. The height of the bank will vary from eighteen to thirty feet above the bed of the river.

"A large amount of rock excavation will be necessary at the guard-lock, and for one mile below, in order to obtain six feet depth in low water in the river; also at the middle lock, and for a half mile below.

"On the flats from four to eight feet of excavation are earth, and the balance rock. The excavated material will generally be used in the embankment and riprap walls, and can be hauled from the pit directly to the point required, and thus save the expense of barrowing the materials from other points to form the bank.

"The character of the earth in the adjoining hills or banks is very favorable for forming solid and water-tight banks, but for a considerable part of the distance the rock runs up so high on the hills that it will be expensive obtaining the same, and for this reason a high price has been used in the estimate.

"There is probably no stone on this side of the river that will answer for face-stone for the locks, but for the backing and vertical wall, stone can mostly be obtained here, and perhaps a large portion of the excavated rock can be used for this purpose.

"On the Illinois or east side of the river, within a reasonable distance of the work, are located splendid quarries of magnesian and other limestones, which will answer every purpose for face and dimension stones, and which can be delivered on the ice during the winter, or in boats during the summer.

* * * * *

"The magnitude of this work is such that the actual cost per mile must far exceed the general cost of most of the canals in this country. The enlarged Erie, with a prism of fifty-six feet width of bottom, seventy feet surface, and seven feet depth of water, with double locks one hundred and ten by eighteen feet, has cost about \$91,000 per mile. The proposed canal will have a cross-section of prism about four times as large as the Erie, with locks three times as wide. The banks will be almost entirely built in the river, with a heavy guard bank to protect against high-water, while the Erie canal has comparatively a small amount of this kind of work.

* * * * *

"I would recommend that the upper 'chain' be improved by excavating on the west side of Montrose island a channel two hundred feet wide and six feet deep at low-water; and, for the purpose of preventing the water from spreading out towards the Nauvoo or east side of the river, for at least half the length of the channel, that a stone pier, extending down from the foot of said island for one hundred feet, be built parallel with the channel. The excavation can be done by constructing coffer-dams, say three in number, which shall embrace an area of one thousand by two hundred and thirty feet each, pumping out the water and excavating the rock by the ordinary process of drilling and blasting. If it be necessary to contract the water still further, the excavated material can be used to form a wing-dam from the channel to the west shore.

* * * * *

"From all the information in my possession, it seems that a depth of five feet is all that can be obtained in the river above, until improvements shall be made to increase the same. If the demands of commerce shall ever call for this increased depth, it will seem to have been a great oversight not to have made the improvement of the rapids for six feet depth of water, even though the cost had thereby been greatly augmented. Therefore, in view of what the commerce of the river may hereafter demand, I would recommend that the channel be made six feet deep at low water. This is undoubtedly all that will ever be required, inasmuch as no greater depth can probably be obtained in the river above.

"If a dam were built across the river at Nashville, raising the water four feet, the most of the rock excavation in the canal and a very large part of that in the channel at the upper 'chain,' would be avoided, and the cost of the whole work materially reduced. Such a dam would, however, prevent boats from navigating the river, and compel them to use the canal even when the water in the river is of sufficient depth; it is therefore inadmissible.

"The annexed estimates for the canal are based on three hundred feet width and six feet depth; but it will be seen that by reducing the width to two hundred feet, where the excavation of earth and rock occurs, a saving of two hundred and eighty thousand dollars can be made. This reduction would occur in detached portions, where the canal leaves the river, and, in my opinion, would answer every purpose. If it should afterwards be considered necessary, the additional one hundred feet could be excavated during the suspension of navigation.

"In order to obtain the materials for embankment, and to locate a good line for the canal, it would be necessary to alter in several places the line of the public highway, and of the Keokuk and Fort Madison railroad. The total length of each which requires alteration is about three miles, and the cost is embraced in the annexed estimates.

"There are several small streams which will have to be taken in, and as the river guard bank must be carried very much above the surface of the water in the canal, no waste-weirs can be constructed at these points. The most important of these streams is Price's creek. If they, in times of freshet, bring too much water, it will have to be passed off in sluices, which must be constructed around the lift-locks. The cost of these sluices is provided for in these estimates."

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Time required to construct the work.

"In the construction of the canal, the first season should be occupied in excavating a part of the canal, putting in the bottom of the outside of the riprap wall for the entire length, and raising it from ten to fifteen feet high. This can be done and allow the high water of the next spring to overflow it and do no harm. During the second year the excavation should be continued, the earth for embankment put in, and the outside riprap wall completed. The third season the excavation for the canal should be finished, the inside riprap wall put in, and the remainder of the bank and walls completed. For the locks, the first season should be occupied in procuring, preparing and delivering materials at the work. The second season the coffer-dams should be put in, the lock-pits excavated, the foundations prepared, and a portion of the masonry laid. During the third year the masonry, gates, embankment and all the other work should be completed. In this manner, if the work is commenced in the ensuing summer, the whole can be completed in the fall of 1869, or in about two and a half years.

"The channel and pier at the upper chain can be finished by the fall of 1868, or in one and a half years.

Cost of maintenance.

"The general average cost for the repairs of the enlarged Erie canal for the last five years has been about one thousand dollars per mile per year, including all items of repairs, superintendence and lock-tending. This canal is three hundred and fifty miles long, and has fifty-seven double locks.

"It is my opinion that the maintenance of the proposed canal and locks cannot exceed two thousand dollars per mile per year for the next ten years, and that for the first five years it will not be over one thousand dollars per mile per year, unless some unforeseen accident shall occur. At this rate the cost of repairs of the whole canal for ten years will be fifteen thousand two hundred dollars per year."

* * * * *

"If the demands of commerce shall ever require a double set of locks, the proposed ones can be so located on one side of the centre as to leave sufficient room for the construction of other locks by their side without, in any manner, disturbing the outside river embankment wall.

"In the prism of the canal and in the locks provision is made for a depth of nine feet, when there is a rise of three feet in the river, in order that boats of eight feet draught may pass through the canal.

"I have prepared a plan for the lower lock, of the dimensions and form heretofore described, the general detail of which, with the exception of the reversed gates, will apply to the other lift-lock and guard-lock. It is supposed that the foundation of all the locks will be on rock of such a character as to obviate the necessity of using timber.

"The gates are to be of wood, properly arched on the upper side, and strengthened with wrought iron braces of hog chains on the lower side. This it is believed will answer the purpose designed, and the expense will be much less than that of iron gates. It is proposed to hang the gates on the suspension plan, which has been successfully applied to the locks on the St. Mary's canal, between Lakes Huron and Superior."

* * * * *

Detailed estimates of the cost of all the work are hereto annexed, of which the following is a summary:

For a canal 300 feet wide and 6 feet deep, with a channel at Montrose 6 feet deep :

Cost of canal embankment and walls	\$1,717,480
Cost of lift locks	371,265
Cost of middle lock	244,910
Cost of guard	242,825
Total cost of canal and locks	\$2,576,477
Cost of channel and pier at Montrose	619,155
Total	\$3,195,632
Add contingencies and engineering	194,365
Total cost	\$3,390,000

For a canal 300 feet wide in embankment, and 200 feet wide in excavation, and 6 feet deep, with a channel at Montrose 6 feet deep :

Cost of canal embankment and walls	\$1,454,680
Cost of lower lift, lower lock	371,265
Cost of middle lift lock	244,910
Cost of guard lock	242,825
Total cost of canal and locks ..	\$2,313,677
Cost of channel and pier at Montrose	619,155
Total	\$2,932,832
Add contingencies and engineering	177,165
Total cost	\$3,110,000

For a canal 300 feet wide and 5 feet deep, with a channel at Montrose 5 feet deep :

Total for a canal 6 feet deep, and locks as above	\$2,576,477
Deduct difference in cost for 5 feet	220,000
Cost of canal and locks	\$2,356,477
Total for channel and pier at Montrose	\$619,155
Deduct difference in cost for 5 feet	157,500
Cost of channel and pier	461,655
Total	\$2,818,132
Add for contingencies and engineering	171,868
Total cost	\$2,990,000

For a canal 300 feet wide in embankment, 200 feet in excavation, and 5 feet deep, with a channel at Montrose 5 feet deep :

Total for a canal 6 feet deep, and locks as above	\$2,313,677
Deduct difference in cost for 5 feet	220,000
Cost of canal and locks	\$2,093,677
Total for channel and pier as above	\$619,155
Deduct difference in cost for 5 feet	157,500
Cost of channel and pier	461,655
Total	\$2,555,332
Add for contingencies and engineering	154,668
Total cost	\$2,710,000

From the foregoing it will be seen that provision has been made in the estimate for the reduction of the canal, where excavation is necessary, to 200 feet in width should it be deemed advisable ; but this is not recommended, since the full width of 300 feet will be required for the meeting of boats and their barges ascending and descending.

As the delays are more apt to occur at the locks than elsewhere, the full width should be preserved, especially in their vicinity. If the canal for boats of four feet draught is adopted, its width of 300 feet should be preserved throughout.

THE ROCK ISLAND RAPIDS.

The Rock Island or Upper rapids extend from Leclaire to Davenport, a distance of 14.26 miles, measured on the Iowa shore, with a total fall of 21.46 feet. The mean width of the Mississippi in this distance is about 2,500 feet, varying from 1,500 feet (at Port Byron) to 3,960 feet, (below Campbell's island.) The area of cross section varies from 6,829 square feet (on Moline "chain") to 21,093 square feet, (at the foot of St. Louis "chain.") The greatest velocity is on Moline "chain," being 5.0545 feet per second, or about three and a half miles per hour at low water. The least velocity is found opposite Hampton, being not greater than one and a half miles per hour.

The great difference in hydrographic features between the Rock Island and the Des Moines rapids must find its explanation in the geological structure of the country. At the Des Moines rapids the river runs over an inclined stratum of a single rock formation, the cherty limestone of the Keokuk series, the dip of which is equal to the present inclination of the water surface. At the Rock Island rapids the geological conditions are entirely different. Here we find at the head of the rapids, near Leclaire, a magnesian limestone of upper Silurian age, (Niagara group,) about fifty feet thick, dipping to the southward more rapidly than the surface of the water, its top layers disappearing below water near Hampton. Succeeding this, in regular sequence, we find, below Hampton, limestones of the Devonian age, commonly referred to as the Hampton group, the successive ledges of which crop out on both river banks and occasionally in the river bed, forming "reefs" or "chains."

The consequences of this difference in geological structure are at once apparent in a comparison of the profiles of the two rapids. While in the Des Moines rapids we find a uniform depth and width throughout their entire length, varying only in depth and width of comparatively insignificant fissures or channels, we have in the Rock Island rapids true "reefs" or "chains" obstructing navigation for a short distance each, and separated by deep intervals or "pools," from six to thirty feet in depth. Of the fourteen miles between the head and foot of the rapids, nearly eleven miles afford good navigation in the lowest stages, the obstructed portions covering a distance of only a little more than three miles.

At the Rock Island rapids the total descent is about the same as at the Des Moines rapids, but in the latter case it is mostly found in the lower seven miles, whilst in the former it is nearly equally distributed over their entire fourteen miles.

The average length of time when the water is less than four feet on Moline, the shoalest of the "chains," is about ninety days; more than four feet about one hundred and eighty days, or two-thirds of the average boating season.

From these circumstances, and the reasons set forth in the report of my assistant, Brevet Lieutenant Colonel P. C. Hains, embodied herein, I have the honor to recommend that the navigation of these rapids be improved by excavating the natural channel, so as to give a width of two hundred feet, and a navigable depth of four feet at extreme low water, the plane of reference being the low water of 1864.

The disparity of cost between this plan and that of a canal leaves no doubt in my mind as to which should be adopted, notwithstanding the fact that the slack-water of the canal would be a great advantage in itself to the boats navigating it.

It is believed that the plan recommended can be executed at these rapids without any extraordinary difficulty, and as the river does not average over two thousand five hundred feet in width, the channel when completed will conform to the natural direction of the main current, will be free from hurtful cross-currents, and will not be difficult to follow during the prevalence of unfavorable winds. A few buoys or pyramids of stone properly placed will enable the boats to navigate it during the night. From this it will be seen that the proposed excavated channel promises all that is required. When finished it will be good for all time, will require no attendance or repairs, and

will not interfere with any other plan, should the future improvement of the river render a further improvement necessary.

The amount of commerce and navigation interested in the improvement of these rapids is essentially the same as that for the lower rapids, and hence, for information on this point, I respectfully call attention to "the statement" previously mentioned.

The details of the plan of improvement of the upper rapids are given in the following report of Brevet Lieutenant Colonel Hains.

DAVENPORT, IOWA, *December 20, 1866.*

SIR: In obedience to your orders of the 5th of October, 1866, directing me "to proceed to Davenport, Iowa, for the purpose of making a detailed survey and examination of Rock Island rapids of the Mississippi river," and of your letter containing more detailed instructions of the same date, I have the honor to submit the following report, with the accompanying drawings:

I left Keokuk, Iowa, on the 6th of October, 1866, arriving in Davenport, Iowa, the next day, and immediately commenced organizing my parties; and in order that the work might be pushed forward with the greatest despatch consistent with the importance of the work, and inasmuch as the season for work would be of short duration, I put into the field all the force that could work to advantage.

The hydrographic party was placed under the immediate charge of Mr. J. E. Abbott, civil engineer. Their work included all that related to the topography of the bed of the river, and other information concerning the flow of the water over the rapids.

A larger party was placed under the charge of Mr. W. A. Clark, civil engineer, with a view of making an accurate survey of the valley on both sides of the river, showing the meanderings of the shores, and gathering all other information necessary for the investigation of the several projects for the improvement of the navigation on the upper rapids. Lines of levels were run on both shores from a point about four miles below Rock island to a point about four miles above Leclaire. Perpendicular offsets connecting with the main line at various distances from 50 feet to 500 feet apart, according to the changes in the general feature of the shore, were run. The accompanying maps show the work that has been accomplished better than any explanation.

As the time allowed us would not warrant an entire resurveying of the bed of the river, and, moreover, as General Warren's map, whenever tested, proved to be sufficiently accurate, I caused Mr. Abbott's party to restrict themselves at first more particularly to a thorough examination of the bottom on the chains, in order to get the most accurate possible data for estimating the amount of rock excavation necessary to make a channel of two hundred (200) feet width and four feet depth in low water. A favorable season has, however, enabled us to accomplish more hydrographic work than could reasonably have been anticipated.

The upper or Rock Island rapids begin at a point near the lower end of Rock island, and extend 14.26 miles up the river to a point near the lower end of the town of Leclaire. The bed of the river throughout this entire distance consists of a hard surface of limestone rock, worn in many places into deep furrows by the long-continued action of the water and the material washed along the bottom. This rock crops out along the shores, and is generally found stratified in thin layers. The lower strata in the bed of the river appear to be harder and of different thicknesses, from four inches to two feet and upwards.

There are also a number of large erratic boulders of granite to be met with; but these, as a general thing, do not present serious obstructions, but in some cases, as at Campbell's chain, they rather serve as guide-marks for pilots, who would protest against their removal on that account, unless replaced by other equally permanent marks.

The only difficulty in the way of navigating the rapids consists in passing over the chains. Of these there are seven, viz.: the upper or Smith's chain, Sycamore, St. Louis, Campbell's, Duck Creek, Moline, and lower chains. At these places the rock bed of the river projects out from each shore like a bar, the projecting points sometimes overlapping each other, leaving only a narrow tortuous channel between them,

and in some instances extending like a dam or rocky bar entirely across the river. Between the chains, throughout almost the entire distance, is a wide and navigable channel, with plenty water for boats that navigate the upper Mississippi, and at such places the velocity of the current is much less than on the chains.

Between the head and foot of the rapids, a distance of little more than fourteen miles, nearly eleven miles are good navigation in the lowest stages, the obstructed portions covering a distance of only a little more than three miles.

The channel pursued by steamboats and that followed by rafts are indicated on the accompanying map. The center line of the steamboat channel is also shown in profile.

By referring to the map it will be seen that the steamboat channel beginning at the head of the rapids runs in close to the Iowa shore with plenty of water until it strikes the upper chain, generally called by pilots Smith's chain. Here the channel is narrow, crooked, and the current swift, having a velocity of more than three miles per hour. A large reef or rocky bar known as Osprey Patch stands in the middle of what would otherwise be a wide channel. This chain is not considered, however, as difficult or dangerous as most of the others.

Passing Smith's chain the channel inclines gradually towards the Illinois shore until it comes to Sycamore chain, which is conceded to be the most difficult place to pass on the whole rapids. Here the rocky ledges projecting out from each shore overlap each other, leaving between them only a narrow and crooked water-way. The current being swift, and the turns short, boats in passing are exposed to strong cross-currents, which tend to sweep them on the lower ledge; besides, in one of the sharp bends, a deep pocket has been cut, and a large amount of water runs through it, which by its action tends to draw boats into it, where they sometimes become fastened, and to extricate them involves a loss of much time, and is a labor of much difficulty. The difficulties of Sycamore chain are not the result of a want of sufficient depth of water, for by referring to the profile it will be seen that there is a good depth in the channel, but they arise from its narrowness and crookedness, together with the strong cross-current that sweeps over it.

After passing Sycamore chain the channel runs close to the Illinois shore, passing inside of Crab island, where it becomes very narrow, and then inclines towards the Iowa shore until at St. Louis rocks it reaches a point about midway between the Illinois shore and Fulton's island; passing the St. Louis rocks it again inclines towards the Illinois shore until it reaches St. Louis chain, where the channel becomes narrow again; but boats that pass the chains above or below this, seldom experience great difficulty here. Below this chain the channel opens out gradually into a stretch of three miles, perfectly navigable at all times. In front of Hampton the current becomes quite sluggish. Opposite the head of Campbell's island the channel crosses Campbell's chain, which is not only crooked and exposed to cross-currents, but the rocky ledge extends entirely across the river. In the channel pursued by steamboats across this chain the water is not much deeper than on either side of it. The slough behind Campbell's island is not used for navigation.

After passing Campbell's chain, with the exception of the rocks near Winnebago island, which are somewhat of an obstruction, the channel is wide and easily navigated until it comes to Duck Creek chain, nearly three miles below. Here it is crooked and narrow, so much so as frequently to necessitate the use of anchors at low water for the purpose of working boats through. This is another difficult chain to pass. Below Duck creek the channel widens out again, giving good navigation, with the exception of one narrow place, for about two miles, when it comes to Moline chain.

Here again the ledge of rock extends entirely across the river, and forms, in low water, an impassable barrier to boats drawing more than thirty (30) inches. The water passes over this chain at a mean surface velocity of 3.878 feet per second at low water, and a maximum velocity of 5.0545 feet per second, as determined by actual observations with floats. The dams of Moline and Little Rock islands cut off a large body of water that would otherwise flow out of the main channel; and the universal testimony of pilots establishes the fact that they have raised the water on this chain some ten inches. It is generally conceded that the navigation has been materially benefited in low water, but the increased volume of water has no doubt increased the velocity of

the current also. During the low stages, however, when the velocity of the current is less than at high water, this increase is of little account in comparison with the advantages of getting the increased depth. From Moline chain the channel widens out again, becomes deep, inclining towards the Iowa shore, and is perfectly navigable for the largest boats on the Upper Mississippi until it comes to the lower chain. The channel here is very crooked, but the current is not so swift as on some of the other chains, and consequently not so difficult to pass. This chain is about a half a mile above the Chicago and Rock Island railroad bridge, and no more natural obstructions present themselves below this point in the ordinary low stages.

From the above statement of facts it is evident that these rapids are a serious obstruction to navigation; and though a comparatively small sum of money judiciously expended would do much to relieve the pressing demands of commerce, they have stood and still stand a barrier to the free and full development of the resources of the great Mississippi Valley. True, the States bordering on the river have shown unexampled advances in population, wealth, and prosperity, but it has been in spite of the natural obstacles in their way.

I have no data on which to base an estimate of the loss occasioned by steamboats being delayed on the rapids; they frequently remain fastened on the rocks for days at a time. During the present season one boat, the Little Giant, was delayed on Sycamore chain for ten days. Besides the loss occasioned by delay, there is the danger of loss of life as well as the loss of the boat and cargo. All these are arguments that call for an improvement in the navigation.

It does not devolve upon me to enter into a discussion of the benefits to be derived from the successful execution of a judicious plan of improvement. It must be evident to all that it has now become an absolute necessity, and some plan must be at once carried out.

The average length of the boating season is about two hundred and sixty days. During the winter, as a matter of course, navigation is closed by the ice. When the river is open for navigation, about one-third of the whole time is rendered dangerous by the shoalness of the water on the rapids, and sometimes impassable for boats drawing more than two feet. In the year 1864 the water was lower than had been known before in many years, attaining its lowest point September 2. From the record of the stages of the water kept at the Chicago and Rock Island railroad bridge, it is found that the greatest range between the high and low water during the last seven years is fifteen feet and nine and a half inches, being the high water of 1862 and the low water of 1864; the mean range during the same period being less than twelve feet.

The range between the highest floods and lowest water at other points along the rapids, from the best authority that could be obtained, are at Valley City, opposite Hampton, thirteen feet and eight inches, and at Leclaire twelve feet, which, if correct, shows a diminution of only three feet and nine inches in the fall at high water as compared with that at low.

The average width of the river on the rapids is about half a mile. At Leclaire it is only 1,500 feet in one place, but widens out above and below. Below the rapids the river is wider than on them, as may be seen from the map. A line of levels from the head to the foot of the rapids shows a fall of 21.46 feet in a distance of about fourteen miles, or an average fall of 1.53 feet per mile in low water. The greatest fall is on Moline and Sycamore chains, as may be seen by referring to the accompanying profile.

The area of a cross-section at the head of the rapids, where the river is only 1,650 feet wide, is 30,228 square feet; at a point near Sycamore chain, 12,408 square feet; at Moline chain, 6,829 square feet.

Careful experiments were made on the velocity of the current, in order to determine the amount of discharge over the rapids in ordinary low water. For this purpose two stations were taken, and a number of velocities between them at different distances from the shores determined by floats; a mean of these was taken as the surface velocity. The mean area of the two cross-sections at the stations was taken as the area of the cross-section, and by applying this to D'Aubisson's formulæ for the approximate discharge of a river, it was found to be 36,456 cubic feet per second. The approximate

discharge behind Campbell's island was also determined in the same manner, and was found to be 10,276 cubic feet per second.

With the exception of the places where the bluffs approach close to the river, the banks are usually steep and rocky.

In your letter of instructions, I am required to "locate the Chicago and Rock Island railroad bridge on my maps, and ascertain the direction of the current through its bays, and state its general influence on the free navigation of the stream by every kind of craft." The bridge is accurately located on the map of the rapids herewith transmitted, and also on an enlarged scale on sheet No. 2. A series of experiments with floats sunk in the water two feet below the surface were made, and the lines taken by them in floating down the stream carefully fixed by frequent observations with three theodolites. The course of each is indicated on the map, and by an inspection of it it will be seen that the turntable pier makes an angle of about sixteen degrees with the direction taken by the floats. This was in low water. The angle of incidence increases as the water rises.

Having obtained data sufficient to enable me to "state its general influence on the free navigation of the stream," I found that the subject had been thoroughly investigated by more able engineers in 1859. I refer to the board of topographical engineers convened, by an order of the Topographical Bureau, March 1, 1859, and consisting of Captains Humphreys, Meade and Franklin, of the corps of topographical engineers. From their report I extract the following, which shows very clearly the influence it has on the free navigation of the river. I need only add that my investigations are confirmatory of their conclusions:

"The Chicago and Rock Island railroad bridge is thrown from the island of Rock Island to the city of Davenport, Iowa, and it is supported by stone abutments on the shores and six stone piers. The spans (five in number) are 250 feet broad, the draw spans being at the water's level (9½ feet stage) 117 and 112 feet respectively. The whole length of the bridge is 1,535 feet.

"The piers, except those of the draw, are 35 feet long and 7 feet broad at top, and 53 feet long and 11 feet broad at bottom; the two small draw piers 38 feet long and 10 feet broad at the top, and 54 feet long and 14 feet broad at the bottom; the turn-table pier, including the guard-pier and starling, is 350 feet long, 40½ feet broad at the top, and 386 feet long, and 45 feet broad at the bottom."

The following is the decision of the board:

"1st. That the railroad bridge which crosses the Mississippi river between Rock island in the State of Illinois, and Davenport in the State of Iowa, is not constructed according to correct principles, reference being had to the interests of navigation.

"2d. That the piers of the said bridge are not of the best form, and that there was no practical difficulty in constructing them of the proper form. With the exception of the turn-table pier, the board is of the opinion that the defective form of the piers is a matter of no material importance. * * *

"3d. The only pier larger than is necessary is the turn-table pier. This pier, in the opinion of the board, should have been constructed no larger than was absolutely necessary to sustain the truss when the draw is open and protect it from injury from passing boats. It might have been constructed with a length of 295 feet, affording ample support and protection, and being actually 355 feet in length, the difference, 65 feet, is unnecessary, and, in the opinion of the board, pernicious. The effect of making it larger than was absolutely necessary is to contract the water-way, increase the velocity, narrow the draw-passage, and present more surface for boats to strike against, thus increasing the difficulty of their passage through the draw. In a pier of this size the starling is of importance, and the upper faces of the piers should have been curved surfaces.

"4th. The piers are not placed parallel with the current, but at angles varying from 26 degrees to 14 degrees 30 minutes. The effect of this obliquity is to treble the obstruction to the flow of the water, and consequently to affect the increase of velocity in the same ratio. Another consequence is that the passages of steamboats and rafts through the draw and between the piers are rendered much more difficult and hazard-

ous ; furthermore, the draw on the Iowa side is rendered useless by the formation of an eddy therein.

* * * * *

"6th. The eddy on the Iowa side of the turn-table pier, as nearly as could be estimated, is about one hundred feet wide at the foot of the pier, and the turbulence or boiling of the water extends about five hundred feet below. This eddy is constantly varying in its position and dimensions. Its effects on the passage of boats ascending and descending is undoubtedly to render them more difficult, on account of the care required to avoid getting one part of the boat in it when another part is in the current of the draw.

* * * * *

"8th. The bridge is badly located, and, in consequence of this bad location, is a greater obstruction to the passage of steamboats and rafts than would have been necessary had the location been good. Any site in the vicinity below Rock Island, out of the rapid current, would have been better. The board having this point in view, examined the line of the ferry between Rock Island City and Davenport, and found there would be no practical difficulty to the erection of a bridge at this site, or near it, which, if constructed upon proper principles, would be of no material obstruction to navigation."

Although there is no evidence of any specific plan having been proposed for the improvement of these rapids except that of improving the natural channel itself by excavation, so as to give four feet depth in low water and a passage-way two hundred feet in width, several plans have been proposed, in a general way, for overcoming the difficulties.

It has been proposed to erect dams across the river, with locks for steamboats and chutes for rafts and flat-boats, making a slack-water navigation in the river. A careful inspection of the map of the rapids will show that, in order to carry out such a plan, it will require at least two locks and three dams, to avoid overflowing the bottom-lands between the river and the bluffs. One dam and lock should be located just above the town of Hampton; the next lock near the city of Rock Island, at the lower end of the slough between Rock island and the Illinois shore; and one dam at the head and another at the foot of Rock island, between it and the Iowa shore. But, without making a detailed estimate of the cost of such a plan, it seems to me altogether inadmissible for the following reasons, viz :

1st. No craft of any kind, however large or small, could pass up stream without going through the locks; the smallest skiffs and largest steamboats would alike be subjected to this inconvenience at all times.

2d. It would obstruct the navigation of the river during the time when no difficulties are experienced on the rapids. For five or six months in the year, or about two-thirds of the navigable season, the river is high enough not to require an improvement; and in order to overcome the natural obstructions during a period of about three months, we would be submitting an artificial one during the other six.

In planning an improvement for the rapids of the Mississippi river one point must not be lost sight of, viz., the improvement must not of itself become an obstruction; and no plan should be adopted for the improvement of navigation in low water that would be prejudicial to its present state in high water. On this point I am not alone, and respectfully call your attention to the report of the board of engineers, convened at my request and in obedience to your orders, a copy of which is herewith appended.

Plan of improvement by means of an independent lateral canal on either side of the river :

I have no hesitation in saying that, in my opinion, this plan is far preferable to the foregoing, no matter on which side the canal should be located. Though it has some objections, it recommends itself from the fact that it in no way interferes with the river as it is, and it will be navigable at all times, night or day, windy or foggy weather.

I have not made any estimate of the cost of constructing a canal on either side of the river, first, on account of the limited time at my disposal, and, second, because I think the time has not yet come when it is necessary to resort to a canal as a means of overcoming the difficulties of navigation on these rapids. It is certain, however, that a

canal of the dimensions necessary to accommodate the commerce of this river cannot be built on either side for less than about two and a half million to three and a half million dollars.

The third plan, viz., by improving the natural channel of the river, will recommend itself to all on account of the obvious advantages of having an improvement of this kind free from all tolls and sources of delay. I have already described the difficulties in the way of navigation on the rapids. Between the chains there are long reaches of navigable river, varying in depth from six feet upwards, the difficulties being confined to the chains almost entirely, a few boulders and patches of rock which can easily be removed occurring here and there between them.

As I have already remarked, I think that the time has not yet come when a canal is necessary in order to overcome the difficulties of navigation on the rapids, nor is it difficult to see that even a canal improvement would fail to confer all the benefits on commerce that a perfect improvement of the river itself would. I have conversed with a number of persons interested in the navigation of the Upper Mississippi, and they all admit that four feet of water on the rapids is all that is required. In fact, in low stages, boats cannot carry more than from three feet to four feet above and below, and hence more than four feet on the rapids is unnecessary. As this depth can be had more economically and quickly by the plan of improving the channel than in any other way, and, moreover, as it gives all the facilities that the present commerce demands, I am of the opinion that this is the plan that should be adopted.

If, however, at any future time, the navigation of the river should be improved so as to produce more than four feet above and below the rapids in low water, and consequently to require more than four feet on the rapids, I would recommend the adoption of some other plan, as the amount of excavation in that case (supposing the river was improved so as to secure six feet) would probably be so great as to render its cost far more than the construction of a canal. But let me add that, whatever may be the ultimate demands of commerce, or the ultimate plan that may be adopted to satisfy those demands, this improvement will in nowise be thrown away. It will always be useful, and should, in my opinion, be made, even though a canal were to be built to-morrow.

There are many boats navigating the Upper Mississippi that never require more than four feet, and for such this improvement will, at all times, be ample; besides, it is probable that when more than four feet has been obtained in low water on the bars above and below the rapids, the commerce of this river will be beyond the capacity of any one canal to accommodate.

There are many advantages connected with the channel improvement that do not exist in connection with other plans, and these must all have weight in deciding this question.

It will be free. It will not require an annual appropriation from the general government to keep it in repair, and when completed will be permanent. It will not interfere with a canal improvement in case that should, at some future time, become advisable or necessary; and, moreover, the benefit arising from this plan will be felt as the work progresses. Every patch of rock removed is that much benefit to navigation; whereas a canal improvement can be of no benefit until completed. The latter, however, has one advantage, viz., in affording safe navigation in the darkest and stormiest nights.

The principal objection urged against the application of the channel improvement at these rapids is without substantial foundation. It is feared that by deepening the channel to four feet in low water, and widening it to two hundred feet, will increase the capacity of the water-way to such an extent as to draw off from the pools above such an amount of water as to develop new dangers where they heretofore did not exist. But, by a careful examination, one can scarcely fail to see that this objection is groundless.

At the upper or Smith's chain, besides removing a few patches of rock that are a source of difficulty, there will be a few points of the projecting ledges cut off, as indicated on the accompanying map. The excavated material can be deposited below the last cut, in order to check the velocity of the current and make it conform more to the direction of the channel at this turn. Certainly this can have no prejudicial effect; the channel is already deep enough, the difficulty being in making the sharp turns.

At Sycamore the cutting will be almost entirely from the projecting ledges, and the material can be used in closing the deep pocket that runs off towards Mechanics' Rock, which produces a strong cross-current and carries off an immense volume of water from the main channel. The amount of water cut off from this pocket will more than compensate for the increased capacity of the new channel. The other cuts between this chain and Campbell's are so slight as to render this consideration unnecessary.

At Campbell's chain there will be a long cut, and the capacity of the new channel here will doubtless be increased, but the current is not rapid, and by closing the slough behind Campbell's island (which, as I have already remarked, is not used for navigation) with the excavated material, a much larger volume of water can be thrown into it than its increased capacity can carry off.

I should have mentioned that by closing the slough behind Fallon's island some benefit would doubtless be felt in the raft channel and on St. Louis chain.

At Duck Creek chain we cannot compensate for the increased capacity of the new channel by closing up sloughs in its vicinity, but we can accomplish the same end by depositing the excavated material in the river in the form of a dam, and thus throw into it any amount of water that may be necessary.

At Moline chain, the slough behind Rock island has already been practically closed by the Moline dam, and, according to the testimony of pilots, the depth of water on the chain has been increasing at least ten inches. There is no doubt but that the removal of a portion of this reef, as it extends entirely across the river, will affect, in a slight degree, the level of the water for a short distance above, and may necessitate the removal of a few rocks; but the upper edge of the reef where the channel crosses it slopes off into deep water, as may be seen by referring to the accompanying profile of the channel. In making this cut the slope of the water surface will be lessened, and the area of the cross-section increased. There are variable elements that enter into the problem of discharge, and would probably neutralize each other so that the velocity discharged would remain sensibly what they were before. By means of a dam made of the excavated material, sufficient water can be thrown into the new channel to more than compensate for its increased capacity of discharge. The waterway across this reef will be increased in cross-sectional area some 300 square feet; but the material taken out would make, if desired, a dam of loose stone four feet high, that would extend entirely across the river. The excavated material can, in each and every case, be disposed of during the operation of the work for closing lateral channels to compensate for the extra quantity of water that would otherwise be drawn off. The places at which the excavation is recommended are shown on the map of the rapids transmitted herewith, and the estimated amount at each place in the annexed tabular statement.

Believing that the plan of improving the natural channel of the river is the one that should, at the present time, be carried out at these rapids, and also that the practicability of getting four feet water in the lowest stages for a channel 200 feet in width is beyond question, I desired to have my views strengthened if they were correct, or their fallacy demonstrated if not; for this purpose I requested that a board be convened, consisting of civil engineers in the government service, for the purpose of considering some of the proposed plans of improvement. The report of the board I enclose herewith.

In regard to the condition of influence of the dams at Rock island, and as to whether or not they can be continued for mill purposes without injury to navigation:—The dams are located on the map accompanying this report. Their influence on navigation has been noticed. They are, without doubt, a benefit to navigation on Moline chain. Their removal is not necessary, but, on the contrary, they had better remain. I would suggest, however, that in low stages they should not be permitted to consume more water than passes through them under existing circumstances. In high stages it makes no material difference.

I have carefully considered the means by which the excavation in the channel can be effected in the most economical, and at the same time expeditious manner. Rock excavation in running water is a difficult undertaking in any case. A comparison with

the cost of excavation at the lower rapids, by Lee and Floyd, can scarcely be instituted as a basis for the same operation here. In the cases referred to, the larger portion of the money was expended in preparing machinery, and when the work was well under way the appropriation ceased. The consequence, as might be expected, was a large sum of money expended and but little work accomplished.

In estimating the cost of excavation at these rapids, I have endeavored to ascertain as nearly the actual sum required as possible, and have taken into consideration the delays occasioned in removing working parties from one point to another, the difficulties of the position, and the character of the rock to be excavated. I unhesitatingly recommend the use of coffer-dams at all points where the amount to be excavated will warrant its expense as the most satisfactory and certain in its results of any plan yet proposed. These points are indicated in the tabular statement above referred to.

The following figures represent the plan, elevation, and section of a coffer-dam on which the estimates for coffer-dams are based. It consists of two rows of two and a half inch iron rods driven into holes drilled in the rock. The distance between the rows and the rods themselves being each five feet, they are braced and tied by diagonal iron bars, as indicated in the plan. The interior and exterior rows of sheeting piles consist each of two rows of two-inch plank inserted between the wall or string-pieces and breaking joints with each other. The number of string-pieces may be increased or reduced as the case seems to require. The holes in which the main piles are driven should be one and a half feet deep, and drilled somewhat smaller than the piles themselves—the latter being driven into them. Between the piles there is five feet of puddling.

Tabular statement exhibiting the amount of rock to be excavated in order to make the present channel 200 feet wide and 4 feet deep, in low water, and the estimated cost of excavating at the various places.

LOCALITY.	Number of cubic yards to be excavated.	Cost of excavation per cubic yard.	Length of coffer dam to be used.	Cost of coffer dam per lineal foot, including construction, pumping, &c.	Total cost of excavation.
<i>Smith's chain.</i>					
Point A.....	20	\$10 00			\$ 200 00
Point B.....	755	10 00			7,550 00
Point C.....	1,357	10 00			13,570 00
Point D.....	246	10 00			2,460 00
Point E.....	80	10 00			800 00
Osprey's patch*.....	1,970	18 00			35,460 00
Point F.....	652	10 00			6,520 00
Point G†.....	2,277	4 50	1,100	\$25 00	37,746 50
Point H.....	296	10 00			2,960 00
Total.....	7,653				107,266 00
<i>Sycamore chain.</i>					
Point A.....	955	10 00			9,550 00
Point B.....	1,630	12 00			19,560 00
Point C.....	160	10 00			1,600 00
Point D.....	212	14 00			2,968 00
Point E†.....	5,416	4 00	1,500	25 00	59,164 00
Point F.....	1,037	14 00			14,518 00
Point G.....	1,008	14 00			14,112 00
Point H.....	886	12 00			16,632 00
Point I†.....	1,632	5 00	300	25 00	15,660 00
Point J*.....	338	17 00			5,746 00
Point K*.....	109	19 00			2,071 00
Total.....	13,383				155,581 00
<i>Crab Island.</i>					
Patch A.....	83	15 00			1,245 00
Patch B.....	1,000	15 00			15,000 00
Point C.....	200	10 00			2,000 00
Point D.....	502	10 00			5,020 00
Total.....	1,785				23,265 00
<i>St. Louis chain.</i>					
Point A.....	211	10 00			2,110 00
Point B.....	189	10 00			6,890 00
Total.....	900				9,000 00
<i>Campbell's chain.</i>					
Boulder A.....	3	20 00			60 00
Centre patch B.....	637	15 00			9,550 00
Boulder C.....	5	20 00			100 00
Boulder D.....	4	20 00			80 00

* Very difficult to work at.

† Coffor dam to be used to advantage.

‡ Coffor dam to be used.

TABULAR STATEMENT—Continued.

LOCALITY.	Number of cubic yards to be excavated.	Cost of excavation per cubic yard.	Length of coffer dam to be used.	Cost of coffer dam per lineal foot, including construction, pump- ing, etc.	Total cost of excava- tion.
Point E*.....	4,423	} \$ 4 00	3,000	\$25 00	\$102,788 00
Point F.....	2,524				900 00
Point G.....	60				300 00
Point H H' H''.....	15				432 00
Point I.....	36				3,900 00
Point J.....	260	15 00			
Total.....	7,967				118,115 00
<i>From Campbell's to Duck creek.</i>					
Centre Patch A.....	118	12 00			1,416 00
Patch B.....	41	12 00			492 00
Patch C.....	55	15 00			825 00
Patch D.....	47	15 00			705 00
Patch E.....	64	15 00			960 00
Boulder F.....	5	20 00			100 00
Patch G.....	35	12 00			420 00
Patch H.....	18	15 00			270 00
Patch I.....	33	12 00			396 00
Patch J.....	45	12 00			660 00
Total.....	471				6,244 00
<i>Duck Creek chain.</i>					
Point A.....	569	10 00			5,690 00
Point B.....	592	10 00			5,920 00
Through cut C*.....	5,258	5 00	1,100	25 00	53,790 00
Point D.....	1,178	10 00			11,780 00
Point E.....	40	12 00			480 00
Point F.....	2,180	10 00			21,800 00
Total.....	9,817				99,460 00
<i>Moline chain.</i>					
Patch A.....	200	12 00			2,400 00
Through cut B.....	12,215	4 00	3,000	25 00	123,860 00
Patch D.....	118	14 00			1,652 00
Patch E.....	15	20 00			300 00
Patch F.....	233	16 00			3,728 00
Total.....	12,781				131,940 00
<i>Lower chain.</i>					
Point A.....	1,347	10 00			13,470 00
Point B.....	380	10 00			3,800 00
Point C.....	948	10 00			9,480 00
Patch D.....	8	20 00			160 00
Patch E.....	5	20 00			100 00
Patch F.....	6	20 00			120 00
Total.....	2,694				27,130 00

* Coffor dam to be used.

From the foregoing we obtain the following as the estimated cost to improve the natural channel of the rapids :

Smith's chain	7,653	cubic yards	\$107,266 50
Sycamore chain	13,383	" "	155,581 00
Crab island	1,785	" "	23,265 00
St. Louis chain	900	" "	9,000 00
Campbell's chain	7,967	" "	118,115 00
Campbell's to Duck creek	471	" "	6,244 00
Duck Creek chain	9,817	" "	99,460 00
Moline chain	12,781	" "	131,940 00
Lower chain	2,694	" "	27,130 00
	57,451		\$678,001 50
Add for contingencies 20 per cent			135,600 30
			<u>\$813,601 80</u>

Average cost of excavation \$14.16 per cubic yard. It may appear at the first glance that the percentage I have added for contingencies in excavating is rather large, but after a careful consideration of the subject, I can only say I am convinced that it is not. Experience has taught us that in excavating rock at the lower rapids, the cost is materially affected by the more or less favorable seasons for working, and, moreover, the rock being in strata of various thicknesses, if in deepening a part to four feet we should come to a stratum two feet thick, the entire stratum must be taken out. The estimate I consider as small as can reasonably be expected to execute a work of such magnitude, at the same time I am of the opinion that the work is of such importance as would justify the expenditure of treble that amount.

I will only add that I consider promptitude in engaging on this work, and energy in prosecuting it, of vital importance. If it is to be done at all, it should be done promptly. Every moment lost is a loss to commerce and to the country.

Estimate of the amount that can be advantageously expended in the fiscal year ending June 30, 1867, \$100,000.

Amount that can be advantageously expended in the fiscal year ending June 30, 1868, \$500,000.

This estimate is based on the fact that economy requires that the most important portions of the work, as that of Sycamore and Moline chains, for instance, when once begun, should be pushed forward to completion at once, so as not to necessitate the expense of coffer-dams twice in the same place.

The balance to be appropriated and used in removing those points of the least difficulty, and during the succeeding low-water season.

Very respectfully, your obedient servant,

PETER C. HAINS,

Captain of Engineers, Brev. Lieut. Col. U. S. A.

Brev. Major General J. H. WILSON, U. S. A.,

*Lieut. Col. 35th Infantry, in charge of the Des Moines
and Rock Island Rapids improvement.*

*Proceedings of a Board of Engineers, convened at the United States Engineers' Office, at
Davenport, Iowa, on the 19th day of December, 1866, in obedience to the accompanying order.*

UNITED STATES ENGINEER'S OFFICE,
DES MOINES AND ROCK ISLAND RAPIDS IMPROVEMENT,
AND ILLINOIS AND ROCK RIVER SURVEYS,
Davenport, Iowa, December 19, 1866.

At the request of Brevet Lieutenant Colonel P. C. Hains, captain of engineers, in charge of the Rock Island rapids survey, a board of engineers will convene at this office 7 P. M. to-day, for the purpose of considering and recommending a plan of improvement for the above-mentioned rapids.

DETAIL FOR THE BOARD.

1. Brevet Lieutenant Colonel P. C. Hains, captain of engineers.
2. Mr. James Worrall, civil engineer, assistant.
3. Mr. D. C. Jenne, civil engineer, assistant.
4. Mr. William F. Shunk, civil engineer, assistant; who will act as recorder.

J. H. WILSON,

Lieut. Col. 35th Infantry, Brevet Major General U. S. A.

The board met in pursuance of the above order, and having carefully investigated the advantages and disadvantages of the various plans proposed for the improvement of the Rock Island rapids, recommend the following :

1. That the present steamboat channel be enlarged by excavation, to a minimum width of two hundred feet, and a navigable depth of four feet at the time of low water, which is somewhat greater than the ruling depth in the river north and south of the rapids during that season. This recommendation is made in view of the economical execution of the work and the present demands of commerce. Should the ultimate interest of commerce demand a greater depth than four feet, as would in case a greater depth could be obtained above and below these rapids, the plan of an independent canal and locks without dams would then best promote that interest, the practical result of such a plan being beyond question.

2. That the excavated materials be so deposited in the river bed as to check cross-currents and confine the volume of water, as far as practicable, to the new channel.

3. That coffer-dams be used in carrying on the work, more particularly, however, at Moline and Campbell's chains. From the best information we can obtain, they can be put in by the 1st of September, the period of low water beginning about this time, leaving at least three and a half months for taking out the material; but as the work is to be done by contract, the mode of operation may be left, to a great extent, to the contractor.

4. That the work should not be entered upon until an appropriation be made which will cover its estimated cost, experience having shown that small consecutive appropriations in such cases augment the ultimate expense beyond all reasonable calculation, and are virtually thrown away in mere preparation.

5. That the improvement which has been proposed by means of locks and dams across the river is in admissible. It would erect an obstruction permanent throughout the year, whereas at high and ordinary stages no hindrance to navigation now exists.

PETER C. HAINS,

*Capt. Engs., Brevet. Lieut. Col. U. S. A.*JAMES WORRALL. *Civil Engineer.*DANIEL C. JENNE, *Civil Engineer.*WM. F. SHUNK, *Civil Engineer.*

General Remarks upon the necessity of improving the Upper and Lower Rapids, based upon statistical and commercial data obtained from official documents and other sources.

The five States, Illinois, Missouri, Wisconsin, Iowa, and Minnesota, bordering on the Mississippi river, are agricultural States, the great staples of which consist of wheat, corn, beef, and pork. They annually furnish from one-third to one-half of all the produce grown in the United States, v:z: wheat, 66,105,786 bushels, or about one-half the entire crop; corn, 244,986,768 bushels, or about one-half the entire crop; cattle, 2,526,979 head, or about one-third the entire crop; hogs, 4,896,506 head, or about one-third the entire crop; or in value, \$677,560,204. Add to this the value of the mining, manufacturing, and mechanical products of these States, valued at \$204,150,000, and we have a total of \$881,710,204.

In the year of 1861-'62-'63 the average yearly tonnage of all American vessels engaged in trans-oceanic commerce and entering the ports of the United States was 2,564,252 tons, and the average tonnage of all these vessels of the various countries engaged in oceanic commerce and entering the ports of the United States was 5,341,867 tons. Now, the three staples contributed (by the five upper Mississippi river States just men-

tioned) to our exports were equivalent to 1,315,000 tons annually. They therefore not only contributed one-third in value to entire our exports, but gave employment upon the ocean to more than one-half of our American tonnage, which was equivalent to one-fourth of all the tonnage of all our trans-oceanic commerce.

New York city is the controlling market for the States, and the value of the surplus products of the different sections are practically regulated by the market value of those products in New York. Accordingly, we usually find the price of wheat, corn, or pork at any particular place to be the respective price of those articles at that time in New York, less the cost of transportation thither. It is the cost of transportation that absorbs the profit on the produce.

There are but two convenient routes of water transportation to New York—one from St. Paul by the way of the great lakes and the New York canals; the other by the way of St. Louis and New Orleans. The latter route is materially affected by the upper and lower rapids. Losses by detention and accidents on the lower rapids alone are estimated at \$500,000 yearly, and to cover extra hazard by these obstructions an additional insurance of thirty to fifty per cent. of the usual rates is asked. If it were not for these obstructions transportation by way of the Mississippi would be decidedly the cheaper, as appears from the following table.

The shipment of a bushel of wheat from St. Paul to New York costs—

Via Chicago :

Freight from St. Paul to Chicago	32 cents.
Transfer at Chicago	02 do.
Freight to Buffalo, N. Y.	10 do.
Transfer at Buffalo, N. Y.	02 do.
Freight from Buffalo to New York	24 do.
	70 cents.

Via St. Louis, with the rapids improved :

Freight from St. Paul to St. Louis	15 cents.
Transfer at St. Louis	03 do.
Freight from St. Louis to New Orleans	12½ do.
Transfer at New Orleans	02½ do.
Freight from New Orleans to New York	20 do.
Extra insurance	02 do.
	55 cents.

being a saving of at least 15 cents per bushel in favor of the latter route, and giving to the producer the benefit of it, as well as a choice of markets.

The Upper Mississippi Valley, in particular, finds in the Mississippi river its only natural outlet for commerce, and, in spite of the present obstructions, employs a large amount of tonnage, as shown hereafter; and as this river is the only highway which is perfectly free to all classes of commerce and every species of craft, its improvement is a matter of interest to every citizen who lives in the region bordering upon it or its tributaries.

From official statistics it appears that, of all the flour, wheat, corn, oats, barley, hay, hemp, tobacco, and pork—valued at \$235,873,878—which found a market at St. Louis during the year 1865, nearly seven-tenths were received from the Upper Mississippi States by the river, and only one-sixth came from other sources. Mr. Howard, the collector of that port, states officially that \$780,706 97 were collected by him for duties on imports during the fiscal year ending September 30, 1866. It is further stated by Mr. Egbert Dodge, in his report to the board of directors of the Union Merchants' Exchange, St. Louis, that important diversions from the river are made at La Crosse, Prairie du Chien, Dunleith, and Rock Island, amounting, in the shipments of flour, corn, barley, oats, hay, and cattle to the east by rail, to *eight-tenths of the entire surplus of the region*, while the shipment by the river south comprises only one-fifth. The chief reasons for this deflection are the existing obstructions at Davenport and Keokuk,

though it cannot be denied that other important laws of trade are exciting their influence in the same directions.

The means of transportation, as steamboats, barges, &c., are corresponding in extent to the considerable trade of the Upper Mississippi Valley.

From the statement prepared by Mr. James F. Griffith, secretary of the Northern Line Packet Company, we find that in December, 1865, there were 910 steamers, with an aggregate of 216,067.83 registered tonnage, and valued at \$24,556,600, on the Mississippi river and its tributaries. Plying on the Upper Mississippi alone there were 304 steamers, with an aggregate registered capacity of 96,296.86 tons, and valued at \$10,556,600.

From this it will be seen that the Upper Mississippi gives employment to one-third of all the steamers on the Mississippi and its tributaries, with nearly one-half of all the tonnage.

This statement is not far from the truth, as the collector of the port of St. Louis alone certifies to 93,607.33 tons in steamers, and 13,055.69 tons in flats, barges, &c., or a total of 106,663.02 tons registered during the fiscal year ending September 30, 1866.

The number of barges, lighters, and similar craft used as auxiliaries is very large; but the enrolling of such being a new, though advisable regulation, the compilation of the same was not carried out.

The importance of the Upper Mississippi is likewise shown by the following data:

In 1865 there were 3,823 arrivals of steamers in St. Louis, with a capacity of 1,229,826 tons; of which the Upper Mississippi Valley contributed 827, with a tonnage of 265,467 tons, or three-tenths of the whole; and of 2,953 departures there were 811, or three-tenths for the Upper Mississippi ports.

In 1866 the arrivals of steamers at St. Louis were 2,972, with a tonnage of 1,227,678 tons, of which the Upper Mississippi contributed 917 arrivals, with a tonnage of 377,804 tons, or four-tenths of all arrivals. The total of departures from St. Louis was 3,066, of which 943, or three-tenths, were for the Upper Mississippi Valley.

In 1866 no less than 677 steamers and 389 barges, going up stream, and 671 steamers and 365 barges, going down stream, passed through the Rock Island railroad bridge.

Besides all this, there is about 400,000,000 feet of lumber annually which finds its way to market on the Mississippi. Not less than two per cent. is added to the price of lumber on account of dangers and delays in passing the obstructions at the rapids.

Contemplating the immense trade of the Upper Mississippi valley, through its natural channel, the Mississippi river, we must come to the conclusion that the obstructions at Keokuk and Davenport are the great drawback of the growing States bordering on the river, and that the damaging influence of these rapids must necessarily increase with the constantly increasing population.

To represent the necessity of the proposed improvement in dollars and cents is, from the nature of the problem, simply impossible; but it is believed that sufficient statistics are embodied herein to show that the work is national, and not local or sectional. A simple calculation will show that the improvement of the rapids of the Mississippi will decrease the cost of transportation by increasing competition between the carriers, thus adding greatly to the wealth of the entire northwest, and removing an oppressive tax from the eastern consumers of its products. Every farmer, manufacturer and mechanic who depends upon the Mississippi river for the transportation of his produce to market, or who consumes a single article of foreign growth or manufacture, will get more for what he sells and give less for what he buys when the navigation of the river shall have been made safe, easy and economical. This being true, the people of the eastern States are nearly as deeply concerned in these improvements as those of the western. The Mississippi river is a great national highway which cannot become the exclusive property of any chartered company, and therefore it must forever remain free to all classes of commerce and every species of craft.

The dangerous places of the sea-coast are marked by light-houses and provided with harbors of refuge at the national expense for the benefit of commerce not exclusively our own. It seems, then, no more than justice that the general government should authorize and provide the means for the improvement of a river in which our own

people are exclusively interested, and in the navigation of which nearly every material interest of the entire country is intimately concerned.

I am, general, very respectfully, your obedient servant,

JAS. H. WILSON,

Lieut. Col. 35th Infantry, Brevet Major General U. S. A.

Brevet Major General A. A. HUMPHREYS,

Chief Engineer U. S. A., Washington, D. C.

APPENDIX A.

Estimate of the cost of constructing seventy-six miles of canal from Nashville to Keokuk, for the improvement of the Des Moines rapids.

ITEMS.	PRICE.	AMOUNT.
<i>For a canal three hundred feet wide and six feet deep, including the necessary protection walls.</i>		
Grubbing and clearing		\$ 3,000 00
1½ mile of bailing and draining, including coffer dams.....	\$30,000 00	45,000 00
304,000 cubic yards excavation of rock	2 00	608,000 00
437,000 cubic yards excavation of earth.....	40	174,800 00
674,000 cubic yards of embankment	50	337,000 00
400,000 cubic yards of embankment, hauled from excavation..	25	100,000 00
10,000 cubic yards of lining	60	6,000 00
50,000 cubic yards of puddling	25	12,500 00
143,000 cubic yards of loose stone and rip-rap wall.....	1 50	214,500 00
200,000 cubic yards of rip-rap wall, made from rock excavation	75	150,000 00
1,000 cubic yards of slope and pavement wall.....	2 00	2,000 00
5,000 cubic yards of vertical wall, laid in hydraulic cement..	5 00	25,000 00
3,170 cubic yards of vertical wall, laid dry.....	4 00	12,680 00
3 miles of changing line of railroad.....	8,000 00	24,000 00
3 miles of changing line of public road.....	1,000 00	3,000 00
Total.....		1,717,480 00
<i>For a canal three hundred feet wide in embankment, two hundred feet wide in excavation, and six feet deep.</i>		
Grubbing and clearing		\$ 3,000 00
1½ mile of bailing and draining, including coffer-dams.....	\$30,000 00	45,000 00
200,000 cubic yards excavation of rock	2 00	400,000 00
300,000 cubic yards excavation of earth	40	120,000 00
67,400 cubic yards of embankment	50	337,000 00
400,000 cubic yards of embankment, hauled from excavation..	25	100,000 00
10,000 cubic yards of lining	60	6,000 00
50,000 cubic yards of puddling earth	25	12,500 00
143,000 cubic yards of loose stone and rip-rap wall ..	1 50	214,500 00
200,000 cubic yards of rip-rap wall, made from excavation..	75	150,000 00
1,000 cubic yards of slope and pavement wall	2 00	2,000 00
5,000 cubic yards of vertical wall, laid in hydraulic cement..	5 00	25,000 00
3,170 cubic yards of vertical wall, laid dry	4 00	12,680 00
3 miles of changing line of railroad.....	8,000 00	24,000 00
3 miles of changing line of public road.....	1,000 00	3,000 00
Total		1,454,680 00

Estimate of the cost of constructing the lower lock of 10½ feet lift, for the improvement of the Des Moines rapids.

ITEMS.	PRICE.	AMOUNT.
Grubbing and clearing		\$ 100
Bailing and draining, including expense of coffer dams.....		40,000
10,860 cubic yards of excavation of rock	\$3 00	38,580
1,000 cubic yards of excavation of earth.....	60	600
60,000 cubic yards of embankment.....	50	30,000
5,000 cubic yards of lining.....	75	3,750
10,000 cubic yards of puddling earth	30	3,000
1,000 cubic yards of slope wall and pavement.....	2 00	2,000
1,000 cubic yards of loose stone	1 50	1,500
5,000 cubic yards of vertical wall in hydraulic cement.....	6 00	30,000
550 cubic yards of vertical wall laid dry	4 50	2,475
13,256 cubic yards of masonry in lock walls	13 00	172,328
500 cubic yards of concrete masonry.....	6 00	3,000
127,200 feet, board measure, of white oak lumber and plank, per M.	100 00	12,720
60,000 feet, board measure, white pine lumber and plank, per M.	60 00	3,600
109,100 pounds wrought iron.....	18	19,638
42,200 pounds cast iron	12	5,064
5,000 pounds spikes and nails.....	12	600
160 lineal feet snubbing posts.....	1 00	160
Sulphur and sand for irons let into masonry.....		500
Painting upper part of lock gates.....		150
130 lineal feet superstructure for drawbridge.....	50 00	6,500
Fixtures for opening and closing gates.....		1,000
Total.....		371,265

Estimate of the cost of constructing middle lock, 8 feet lift, for the improvement of the Des Moines rapids.

ITEMS.	PRICE.	AMOUNT.
Grubbing and clearing		\$ 300
Bailing and draining, including expense of coffer-dams.....		10,000
19,300 cubic yards of excavation of rock	\$2 50	48,250
19,200 cubic yards of excavation of earth.....	50	9,600
12,000 cubic yards of embankment.....	50	6,000
4,000 cubic yards of lining.....	75	3,000
8,000 cubic yards of puddling earth.....	30	2,400
500 cubic yards of slope wall and pavement.....	2 00	1,000
800 cubic yards of loose stone	1 50	1,200
2,500 cubic yards of vertical wall laid in hydraulic cement	6 00	15,000
300 cubic yards of vertical wall laid dry	4 50	1,350
8,652 cubic yards of masonry in lock walls	13 00	112,476
300 cubic yards of concrete masonry.....	6 00	1,800
64,000 feet, board measure, of white oak lumber and plank, per M.	100 00	6,400
42,000 feet, board measure, of white pine lumber and plank, per M.	60 00	2,530
64,300 pounds of wrought iron.....	18	11,574
27,500 pounds of cast iron.....	12	3,300
4,000 pounds of spikes and nails	12	480
160 lineal feet of snubbing posts.....	1 00	160
Sulphur and sand cement for irons let into masonry.....		500
Painting upper parts of gates.....		100
130 lineal feet of superstructure for drawbridge.....	50 00	6,500
Fixtures for opening and closing gates		1,000
Total.....		244,910

